

Installation, Start-Up, and Service Instructions

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that apply.

Follow all safety codes. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguishers available for all brazing operations.

⚠ WARNING	
	<p>Disconnect gas piping from unit when leak testing at pressure greater than ½ psig. Pressures greater than ½ psig will cause gas valve damage resulting in hazardous condition. If gas valve is subjected to pressure greater than ½ psig, it <i>must</i> be replaced before use. When pressure testing field-supplied gas piping at pressures of ½ psig or less, a unit connected to such piping must be isolated by manually closing the gas valve(s).</p>

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

INSTALLATION

Unit is shipped in the vertical discharge configuration. To convert to horizontal configuration, remove screws from side duct opening covers and remove covers. Using the same screws, install covers on vertical duct openings with the insulation-side down. Seals around duct openings must be tight. See Fig. 1.

IMPORTANT: An external filter kit **MUST** be used or the filters **MUST** be field-installed outside the unit on horizontal discharge applications with optional economizer. Otherwise, the economizer must be partially removed to access the filters. The area of the field-installed filters should be equal to the area of the factory-installed filters.

Step 1 — Provide Unit Support

ROOF CURB — Assemble and install accessory roof curb in accordance with instructions shipped with curb. See Fig. 2. Install insulation, cant strips, roofing felt, and counter flashing as shown. *Ductwork must be attached to curb, not to the unit.* If gas, electric power, or control power is to be routed through the curb, attach the accessory thru-the-curb service connection plates to the roof curb in accordance with the accessory installation instructions. Connection plates must be installed before unit can be set on roof curb.

IMPORTANT: The gasketing of the unit to the roof curb is critical for a watertight seal. Install gasket supplied with the roof curb as shown in Fig. 2. Improperly applied gasket can result in air leaks and poor unit performance.

Curb should be level. Unit leveling tolerances are shown in Fig. 3. This is necessary for unit drain to function properly. Refer to Accessory Roof Curb Installation Instructions for additional information as required.

SLAB MOUNT (Horizontal Units Only) — Provide a level concrete slab that extends a minimum of 6 in. beyond unit cabinet. Install a gravel apron in front of condenser coil air inlet to prevent grass and foliage from obstructing airflow.

NOTE: Horizontal units may be installed on a roof curb if required.

Step 2 — Field Fabricate Ductwork — Secure all ducts to roof curb and building structure on vertical units. *Do not connect ductwork to unit.* For horizontal applications, field-supplied flanges should be attached to horizontal discharge openings and all ductwork should be secured to the flanges. Insulate and weatherproof all external ductwork, joints, and roof openings with counter flashing and mastic in accordance with applicable codes.

Ducts passing through an unconditioned space must be insulated and covered with a vapor barrier.

If a plenum return is used on a vertical unit, the return should be ducted through the roof deck to comply with applicable fire codes.

A minimum clearance is not required around ductwork. Cabinet return air static shall not exceed $-.35$ in. wg with economizer or $-.45$ in. wg without economizer.

Step 3 — Install External Trap for Condensate Drain — All units must have an external trap added for condensate drainage. A $\frac{3}{4}$ -in. NPT connection is located on the side of the unit. Use a trap at least 4-in. deep and protect against freeze-up.

If drain line is run to a drain, pitch line away from unit at 1 in. per 10 ft of run. Do not use a pipe size smaller than the unit connection. See Fig. 4 for more details.

Step 4 — Rig and Place Unit — Inspect unit for transportation damage. File any claim with transportation agency. Keep unit upright and do not drop. Spreader bars are not required if top crating is left on unit. Rollers may be used to move unit across a roof. Level by using unit frame as a reference. See Table 1 and Fig. 5 for additional information. Operating weight is shown in Table 1 and Fig. 5.

Lifting holes are provided in base rails as shown in Fig. 6. Refer to rigging instructions on unit.

⚠ CAUTION

All panels must be in place when rigging.

POSITIONING — Maintain clearance around and above unit to provide minimum distance from combustible materials, proper airflow, and service access. See Fig. 6. A prop-

erly positioned unit will have the following clearances between unit and roof curb: $\frac{1}{4}$ -in. clearance between roof curb and base rails on each side and front of unit; $1\frac{1}{2}$ -in. clearance between roof curb and rear of unit. (See Fig. 2, section C-C.)

Do not install unit in an indoor location. Do not locate unit air inlets near exhaust vents or other sources of contaminated air.

Be sure that unit is installed such that snow will not block the combustion intake or flue outlet.

Unit may be installed directly on wood flooring or on Class A, B, or C roof-covering material when roof curb is used.

Although unit is weatherproof, guard against water from higher level runoff and overhangs.

Locate mechanical draft system flue assembly at least 48 in. from any opening through which combustion products could enter the building, and at least 48 in. from an adjacent building. When unit is located adjacent to public walkways, flue assembly must be at least 7 ft above grade.

Flue vent discharge must have a minimum horizontal clearance of 4 ft from electric and gas meters, gas regulators, and gas relief equipment.

Flue gas can deteriorate building materials. Orient unit such that flue gas will not affect building materials.

Adequate combustion-air space must be provided for proper operation of this equipment. Be sure that installation complies with all local codes and Section 5.3, Air for Combustion and Ventilation, NFGC (National Fuel Gas Code), ANSI (American National Standards Institute) Z223.1-1984 and addendum Z223.1a-1987. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

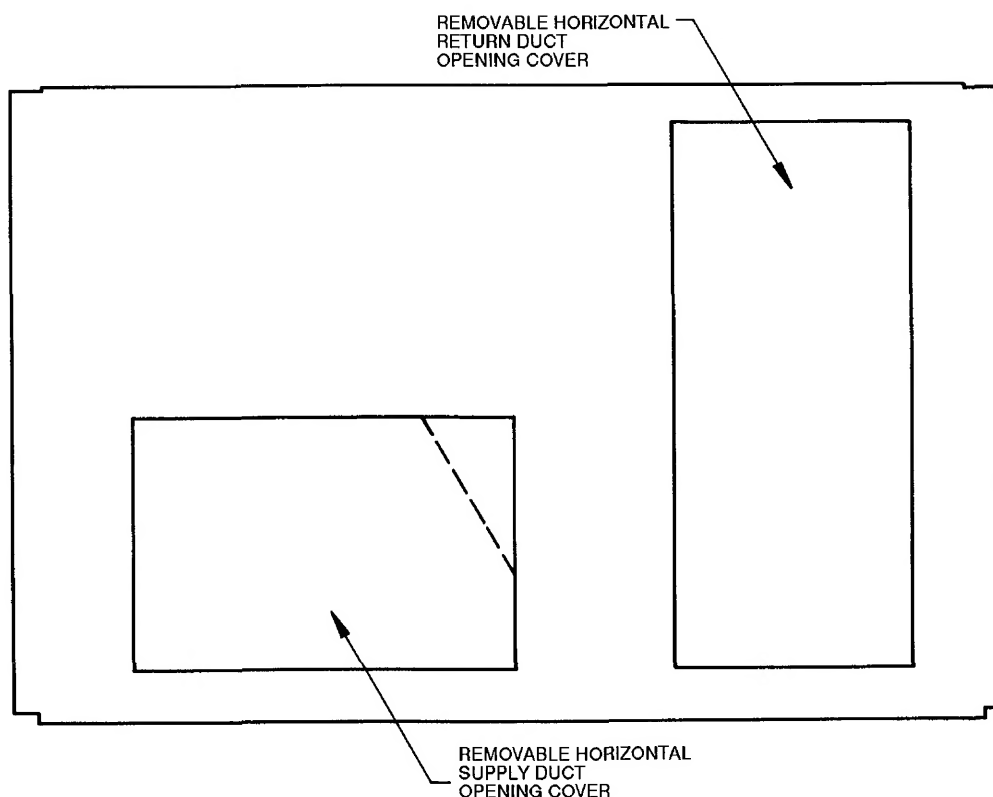



Fig. 1 — Horizontal Conversion Panels

ROOF CURB ACCESSORY	A	UNIT SIZE
50DJ900771	1'-2" [356]	48LJE/LJF004
50DJ900781	2'-0" [610]	48LJD/LJE/LJF005-007

- NOTES:
1. Roof curb accessory is shipped unassembled
 2. Insulated panels.
 3. Dimensions in [] are in millimeters
 4. Roof Curb: galvanized steel
 5. Attach ductwork to curb (Flanges of duct rest on curb.)
 6. Service clearance is 4 ft on each side.
 7.  Direction of airflow

UNIT SIZE	"E" GAS	"F" POWER	"G" CONTROL	CONNECTOR PKG ACY
48LJE/LJF004 48LJD/LJE/LJF005-007	3/4" [19] NPT	3/4" [19] NPT	3/4" [19] NPT	50DJ900791

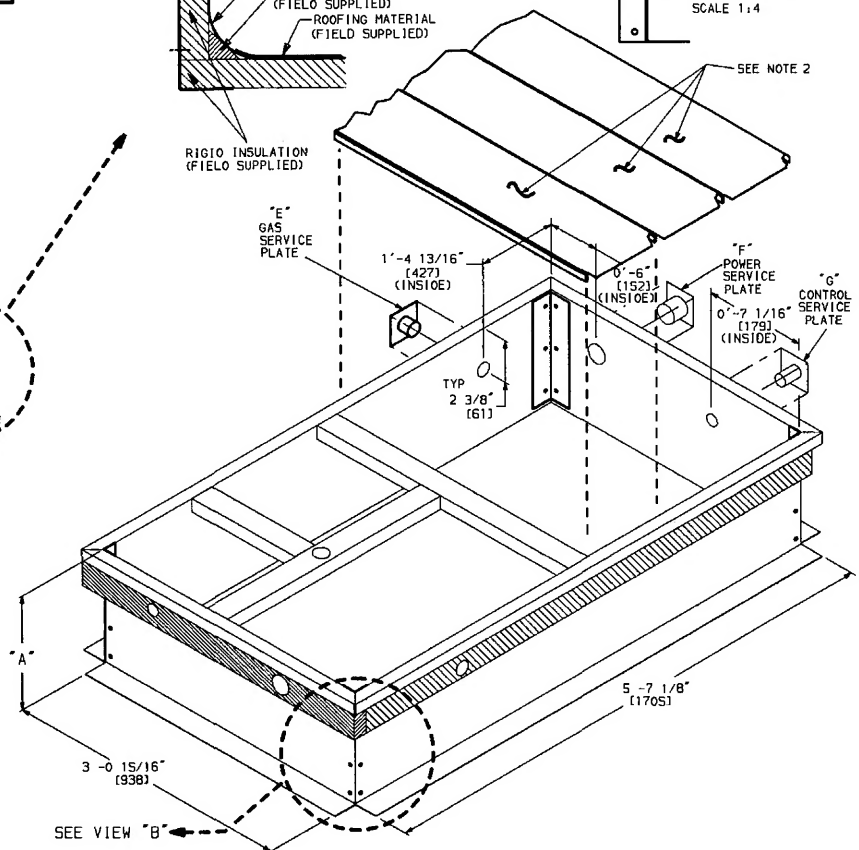
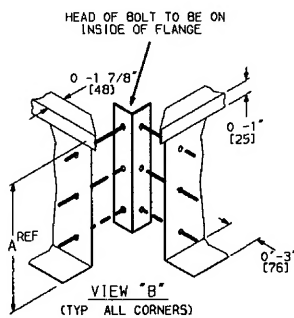
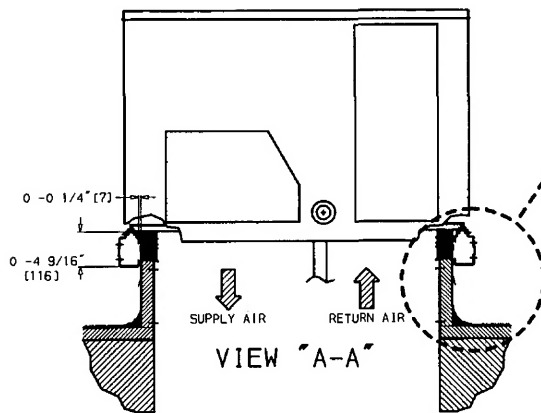
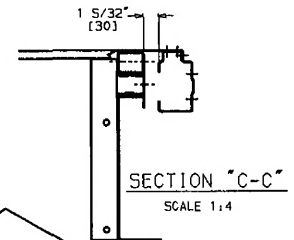
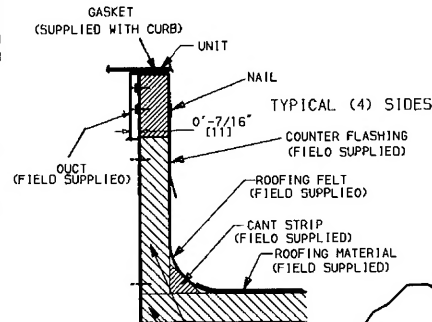
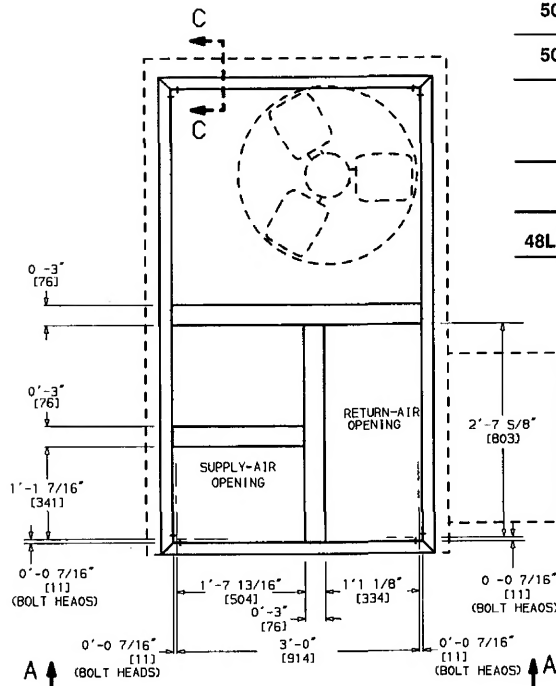


Fig. 2 – Roof Curb Dimensions

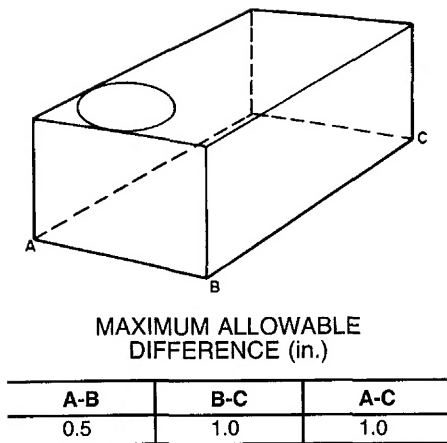
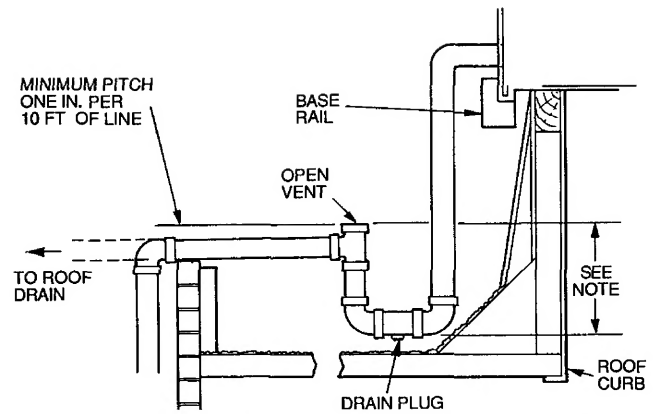
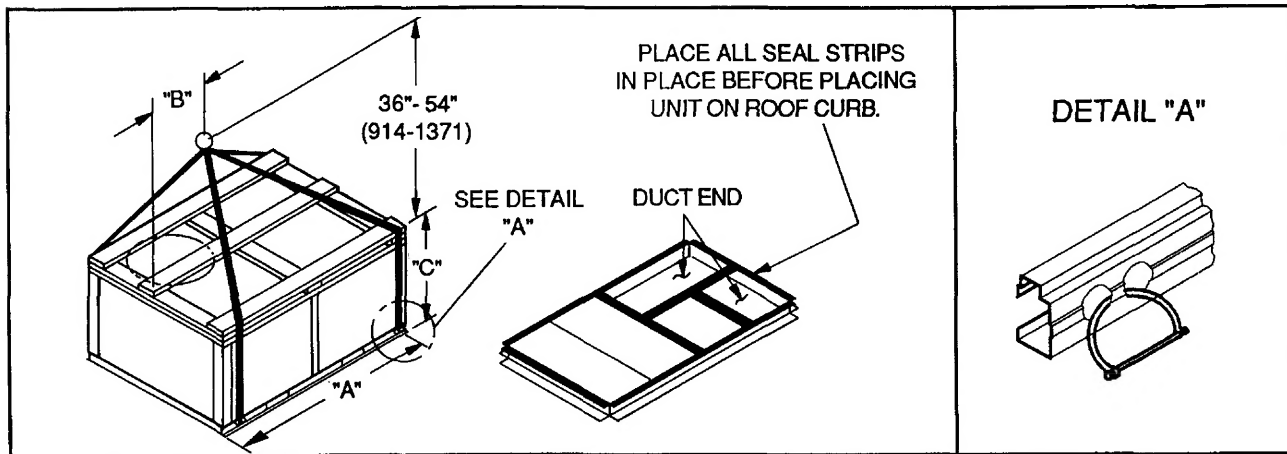


Fig. 3 – Unit Leveling Tolerances



NOTE: Trap should be deep enough to offset maximum unit static difference. A 4-in. trap is recommended.

Fig. 4 – External Trap Condensate Drain



NOTES:

1. Dimensions in () are in millimeters
2. Hook rigging shackles through holes in base rail, as shown in detail "A." Holes in base rails are centered around the unit center of gravity. Use wooden top skid when rigging to prevent rigging straps from damaging unit

3. Unit weights do not include economizer. See Table 1 for economizer weights.

⚠ CAUTION

All panels must be in place when rigging.

UNIT	MAX WEIGHT		A		B		C	
	Lb	Kg	in.	mm	in.	mm	in.	mm
48LJE/LJF004	530	240	73.69	1872	35.5	902	32.52	826
48LJD/LJE/LJF005	540	245						
48LJD/LJE/LJF006	560	254						
48LJD/LJE/LJF007	615	279						

Fig. 5 – Rigging Details

Table 1 — Physical Data

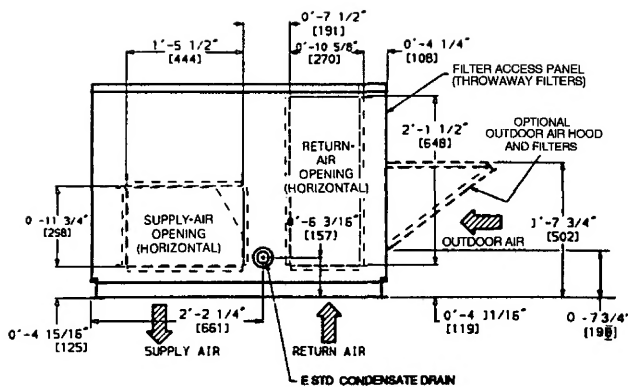
BASE UNIT 48		LJE/LJF004	LJD/LJE/LJF005	LJD/LJE/LJF006	LJD/LJE/LJF007
NOMINAL CAPACITY (tons)		3	4	5	6
OPERATING WEIGHT (lb)					
Unit		530	540	560	615
Economizer		34	34	34	34
Roof Curb		115	115	115	115
COMPRESSOR		Reciprocating	Scroll	Scroll	Reciprocating
Quantity		1	1	1	1
Oil (oz)		55	55	70	65
REFRIGERANT TYPE		6-0	7-6	R-22	9-12
Operating Charge (lb-oz)				8-3	
CONDENSER FAN				Propeller Type	
Quantity...Diameter (in.)		1 ..26.0	1 ..26.0	1...26.0	1 ..26.0
Nominal Cfm		4600	4600	4100	4100
Motor Hp...Rpm		1/3 850	1/3...850	1/3...850	1/3 . 850
CONDENSER COIL			Enhanced Copper Tubes, Aluminum Lanced Fins		
Rows...Fins/in.		1.. 17	2.. 17	2.. 17	2.. 17
Total Face Area (sq ft)		12 25	12.25	12.25	12.25
EVAPORATOR FAN				Centrifugal Type	
Size (in.)		10 x 10	10 x 10	10 x 10	10 x 10
Type Drive		Direct	Direct	Belt	Belt
Std					
Alt					
Nominal Cfm		1200	1600	2000	2400
Maximum Continuous Bhp		Std 34	.81	1 80	2 40
Std					
Alt					
Motor Frame		Std 48	48	56	56
Std					
Alt					
Nominal Rpm High/Low		Std 860/845	1080/970	—	—
Std					
Alt					
Fan Rpm Range		Std 1080/970	—	900-1300	1070-1460
Std					
Alt					
Motor Bearing Type		Ball	970-1310	—	—
Maximum Fan Rpm		2100	2100	2100	2100
Motor Pulley Pitch Diameter A/B (in.)		Std —	1 9/2 9	2 4/3 4	2.8/3.8
Std					
Alt					
Fan Pulley Pitch Diameter (in.)		Std —	3.5	4.5	4 5
Std					
Alt					
Belt — Type...Length (in.)		Std —	A 31	A 39	A 39
Std					
Alt					
Pulley Center Line Distance (in.)		Std —	14 7-15 5	14 7-15.5	14 7-15 5
Std					
Alt					
Speed Change Per Full Turn of		Std —	—	80	79
Moveable Pulley Flange (rpm)		Std —	68	—	—
Std					
Alt					
Movable Pulley Maximum Full Turns		Std —	5	5	5
From Closed Position		Std —	5	—	—
Std					
Alt					
Factory Setting — Full Turns Open		Std —	3	3	3
Std					
Alt					
Factory Speed Setting (rpm)		Std —	1110	1060	1230
Std					
Alt					
Fan Shaft Diameter at Pulley (in.)		—	5/8	1/2	5/8
EVAPORATOR COIL			Enhanced Copper Tubes, Aluminum Double Wavy Fins, Acutrol™ Feed Device		
Rows...Fins/in.		2.. 15	2.. 15	3.. 15	4...15
Total Face Area (sq ft)		4 17	5 5	5 5	5.5
FURNACE SECTION					
Burner Orifice Diameter (in.drill size)*					
Natural Gas — Std		113 33	113. 33/ 113 33/ 129 30	113. 33/ 113 33/ 129. 30	113 33/ 113 33/ 129 . 30
Liquid Propane — Alt		089 43	.089.. 43/ 089 .43/ 102 .38	089 43/ 089 43/ 102 38	089 43/ 089 43/ 102 38
Thermostat Heat Anticipator Setting (amps)					
208/230/460 v					
First Stage		.14	.14	14	14
Second Stage		—/ 14	—/—/ 14	—/—/ 14	—/—/ 14
Gas Input					
First Stage		74,000/82,000	74,000/115,000/120,000	74,000/115,000/120,000	74,000/115,000/120,000
Second Stage		—/115,000	—/—/150,000	—/—/150,000	—/—/150,000
Efficiency (Steady State) (%)		80	80	80	80
Temperature Rise Range		25-55/55-85	25-55/35-65/50-80	25-55/35-65/50-80	25-55/35-65/50-80
Manifold Pressure (in. wg)					
Natural Gas — Std		3 5	3 5	3 5	3.5
Liquid Propane — Alt		3.5	3.5	3.5	3.5
Field Gas Connection Size (in.)		.5	.5	.5	.5
HIGH-PRESSURE SWITCH (psig)†				625	
Standard Compressor Internal Relief				428	
Cutout				320	
Reset (Auto.)					
LOSS-OF-CHARGE/LOW-PRESSURE SWITCH†					
(Liquid Line) (psig)				7 ± 3	
Cutout				22 ± 7	
Reset (Auto.)					
FREEZE PROTECTION THERMOSTAT†					
Opens (F)				30 ± 5	
Closes (F)				45 ± 5	
OUTDOOR-AIR INLET SCREENS				Cleanable	
Qty...Size (in.)				1 ..20 x 24 x 1	
RETURN-AIR FILTERS				Throwaway	
Qty...Size (in.)				2.. 16 x 25 x 2	

LEGEND

Bhp — Brake Horsepower

*The 48LJD005-007 and 48LJE004 (74,000 Btuh) units have 2 burners. The 48LJE005-007 and 48LJF004 (115,000 Btuh) units and the 48LJF005-007 (150,000 Btuh) units have 3 burners.

†Indicates a FIOP (Factory-Installed Option) that requires a control kit.



RIGHT SIDE

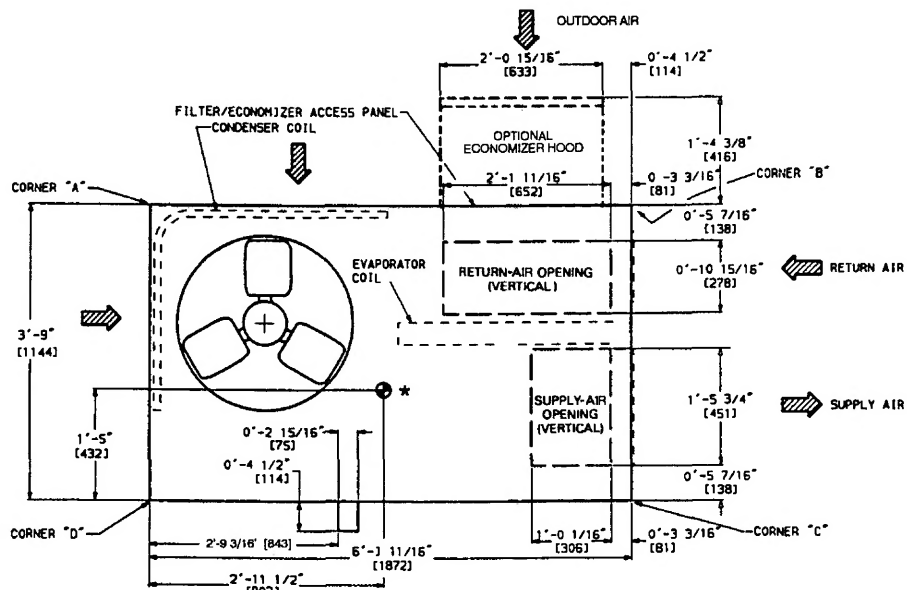
*Indicates horizontal center of gravity
†Indicates vertical center of gravity

NOTES:

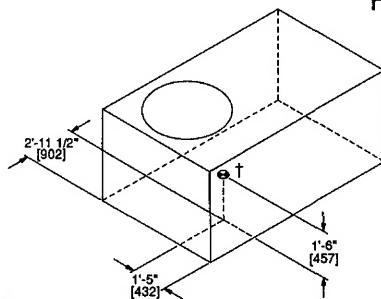
- Dimensions in [] are in millimeters.
- Center of Gravity.
- Direction of airflow
- On vertical discharge units, ductwork is to be attached to accessory roof curb only. For horizontal discharge units, field-supplied flanges should be attached to horizontal discharge openings and all ductwork should be attached to the flanges.
- Minimum clearances are as follows (local codes or jurisdiction may prevail):
NOTE: When installing these units, use the maximum clearance stated for your application
 - Between unit, flue side, and combustible surfaces, 36 inches. (Minimum clearance to combustibles, flue side, is 18 in. for units with accessory flue discharge deflector.)
 - Bottom to combustible surfaces (when not using curb), 0 in. for LJD, LJE units and 1 in. for LJF units.
 - Condenser coil for proper airflow, 36-in. one side, 12 in. the other. The side getting the greater clearance is optional.
 - Overhead, 60 in. to assure proper condenser fan operation.
 - Horizontal supply and return end, 0 inches.
 - Between units, control box side, 42 in. per NEC (National Electrical Code).
 - Between unit and ungrounded surfaces, control box side, 36 in. per NEC.
 - Between unit and block or concrete walls and other grounded surfaces, control box side, 42 in. per NEC.
- With the exception of the clearance for the condenser coil and combustion side, as stated in Notes 5a, b, and c, a removable fence or barricade requires no clearance.
- Units may be installed on combustible floors made from wood or class A, B, or C roof covering material.

UNIT	STD UNIT WEIGHT		ECONOMIZER WEIGHT		CORNER WEIGHT (A)		CORNER WEIGHT (B)	
	Lb	Kg	Lb	Kg	Lb	Kg	Lb	Kg
48LJE/LJF004	530	240	34	15.4	104	47.2	97	44.0
48LJD/LJE/LJF005	540	245	34	15.4	106	48.1	98	44.5
48LJD/LJE/LJF006	560	254	34	15.4	110	49.9	102	46.3
48LJD/LJE/LJF007	615	279	34	15.4	120	54.4	112	50.8

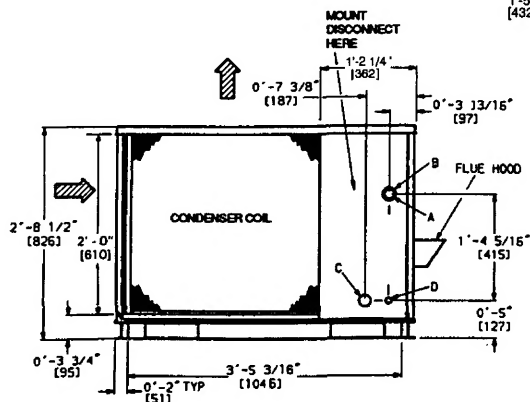
UNIT	CORNER WEIGHT (C)		CORNER WEIGHT (D)	
	Lb	Kg	Lb	Kg
48LJE/LJF004	159	72.1	171	77.6
48LJD/LJE/LJF005	162	73.5	174	78.9
48LJD/LJE/LJF006	168	76.2	180	81.6
48LJD/LJE/LJF007	185	83.9	198	89.8



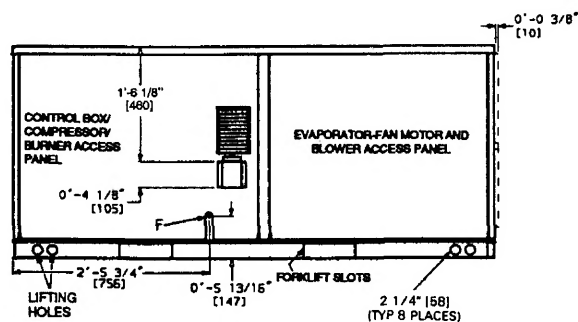
FRONT



Connection Sizes	
A	1 3/8" Dia [35] Field Power Supply Hole
B	2" Dia [50.5] Power Supply Knockout
C	2 3/16" Dia [55] Charging-Port Hole
D	7/8" [22] Field Control Wiring Hole
E	3/4" Condensate Drain
F	1/2"-14 NPT Gas Connection



LEFT SIDE



FRONT

Fig. 6 — Base Unit Dimensions

Step 5 — Install Flue Hood — Flue hood and screen are shipped screwed to the burner compartment access panel. Remove from shipping location and using screws provided, install flue hood and screen in location shown in Fig. 7.

Step 6 — Install Gas Piping — Unit is equipped for use with type of gas shown on nameplate. Refer to local building codes, or in the absence of local codes, to ANSI Z223.1-1984 and addendum Z223-1A-1987 entitled National Fuel Gas Code. In Canada, installation must be in accordance with the CAN1.B149.1 and CAN1.B149.2 installation codes for gas burning appliances.

For natural gas applications, gas pressure at unit gas connection must not be less than 4 in. wg or greater than 13.0 in. wg while unit is operating. On 48LJ005,006,007 high heat units, the gas pressure at unit gas connection must not be less than 5 in. wg or greater than 13 in. wg while the unit is operating. For propane applications, the gas pressure must not be less than 5 in. wg or greater than 13 in. wg at the unit connection.

Size gas supply piping for 0.5 in. wg maximum pressure drop. Do not use supply pipe smaller than unit gas connection. Support gas piping as shown in the table in Fig. 8. For example, a 3/4-in. gas pipe must have one field-fabricated support beam every 8 ft. Therefore, an 18-ft long gas pipe would have a minimum of 2 support beams, a 48-ft long pipe would have a minimum of 6 support beams.

See Fig. 8 for typical pipe guide and locations of external manual main shutoff valve.

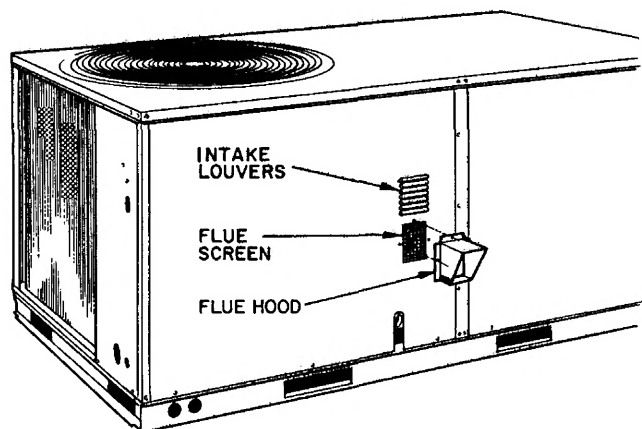
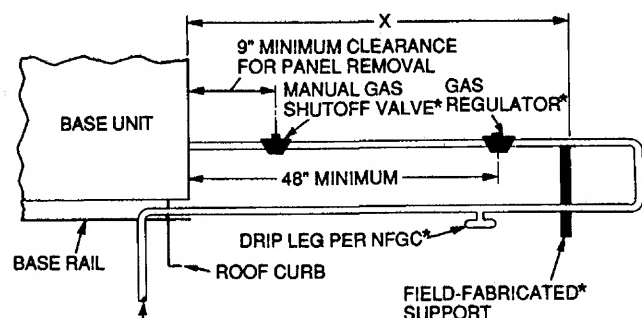


Fig. 7 — Flue Hood Details



LEGEND
 NFGC — National Fuel Gas Code
 *Field supplied.
 NOTE: Follow all local codes

SPACING OF SUPPORTS

STEEL PIPE NOMINAL DIAMETER (in.)	X DIMENSIONS (feet)
1/2	6
3/4 or 1	8
1 1/4 or larger	10

Fig. 8 — Gas Piping Guide (With Accessory Thru-the-Curb Service Connections)

Step 7 — Make Electrical Connections

⚠ WARNING

Unit cabinet must have an uninterrupted, unbroken electrical ground to minimize the possibility of personal injury if an electrical fault should occur. This ground may consist of electrical wire connected to unit ground lug in control compartment, or conduit approved for electrical ground when installed in accordance with NEC (National Electrical Code), ANSI/NFPA (National Fire Protection Association), latest edition, and local electrical codes. *Do not use gas piping as an electrical ground.* Failure to follow this warning could result in the installer being liable for personal injury of others.

FIELD POWER SUPPLY — All units except 208/230-v units are factory wired for the voltage shown on the nameplate. If the 208/230-v unit is to be connected to a 208-v power supply, the transformer *must* be rewired by moving the black wire from the 230-v orange wire on the transformer and connecting it to the 200-v red wire from the transformer. The end of the orange wire must then be insulated.

Refer to unit label diagram for additional information. Wiring leads are provided for field service. Use copper conductors only when splice connectors are used.

When installing units, provide a disconnect per NEC.

All field wiring must comply with NEC and local requirements. In Canada, electrical connections must be in accordance with CSA (Canadian Standards Association) C22.1 Canadian Electrical Code Part 1.

Install conduit through side panel openings indicated in Fig. 6. Route power lines through connector to terminal connections as shown in Fig. 9.

Voltage to compressor terminals during operation must be within voltage range indicated on unit nameplate (also see Table 2). On 3-phase units, voltages between phases must be balanced within 2% and the current within 10%. Use the formula shown in the legend for Table 2, Note 2 to determine the percent voltage imbalance. Operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. Such operation would invalidate any applicable Carrier warranty.

FIELD CONTROL WIRING — Install a Carrier-approved accessory thermostat assembly according to installation instructions included with the accessory. Locate thermostat assembly on a solid wall in the conditioned space to sense average temperature in accordance with thermostat installation instructions. Connect thermostat wires to terminal board.

Route thermostat cable or equivalent single leads of colored wire from subbase terminals through connector on unit to low-voltage connections (shown in Fig. 10).

Connect thermostat wires to matching screw terminals of low-voltage connection board. See Fig. 10.

NOTE: For wire runs up 50 ft, use no. 18 AWG (American Wire Gage) insulated wire (35 C minimum). For 50 to 75 ft, use no. 16 AWG insulated wire (35 C minimum). For over 75 ft, use no. 14 AWG insulated wire (35 C minimum). All wire larger than no. 18 AWG cannot be directly connected to the thermostat and will require a junction box and splice at the thermostat.

Pass the control wires through the hole provided in the end panel; then feed wires through the raceway built into the corner post to the 24-v barrier located on the left side of the control box. See Fig. 11. The barrier provides the UL (Underwriters' Laboratories) required clearance between high- and low-voltage wiring.

Table 2 — Electrical Data

UNIT	NOMINAL V-PH-HZ	IFM TYPE	VOLTAGE RANGE		COMPR (each)		OFM FLA	IFM FLA	COMBUSTION FAN MOTOR FLA	POWER SUPPLY		DISCONNECT SIZE	
			Min	Max	RLA	LRA				MCA	MOCP*	FLA	LRA
48LJE/LJF004 (3 Tons)	208/230-1-60	Std	187	254	17.9	93	1.9	2.8	.57	27.1/27.1	35/35	26/26	105/105
		Alt						3.8				27/27	107/107
	208/230-3-60	Std	187	254	11.2	80	1.9	2.8	.57	18.7/18.7	25/25	18/18	92/92
		Alt						3.8				19/19	94/94
	460-3-60	Std	414	508	6.1	40	1.0	1.5	.30	10.1	15	10	46
		Alt						1.9				10	46
	575-3-60	Std	518	632	4.5	29	1.9	2.8	.57	7.5	15	7	34
		Alt						3.8				8	34
48LJD/LJE/LJF 005 (4 Tons)	208/230-1-60	Std	187	254	24.8	127	1.9	3.8	.57	36.7/36.7	45/45	35/35	141/141
		Alt						5.7				37/37	144/144
	208/230-3-60	Std	187	254	15.7	99	1.9	3.8	.57	25.3/25.3	30/30	25/25	113/113
		Alt						5.7				27/27	116/116
	460-3-60	Std	414	508	7.8	50	1.0	1.9	.30	12.6	15	12	56
		Alt						2.8				13	58
	575-3-60	Std	518	632	5.5	40	1.9	3.8	.57	9.2	15	9	45
		Alt						5.7				10	47
48LJD/LJE/LJF 006 (5 Tons)	230-1-60	Std	187	254	27.8	135	1.9	8.5	.57	45.2	60	44	164
	208/230-3-60		187	254	19.2	105	1.9	8.5	.57	34.4/34.4	40/40	34/34	134/134
	460-3-60		414	508	9.6	55	1.0	4.5	.30	17.5	20	17	81
	575-3-60		518	632	8.3	45	1.9	8.5	.57	14.5	20	14	57
48LJD/LJE/LJF 007 (6 Tons)	208/230-3-60	Std	187	254	21.9	142	1.9	5.8	.57	35.1/35.1	40/40	34/34	188/188
	460-3-60		414	508	10.4	72	1.0	2.6	.30	16.6	20	16	95
	575-3-60		518	632	9.6	58.5	1.9	11.0	.57	17.2	20	17	81

IMPORTANT: Optional, alternate evaporator-fan motor and drive are not available for 48LJ006,007 units. Contact your local Carrier representative for more information about field-installed motors

LEGEND

COMPR — Compressor
FLA — Full Load Amps
HACR — Heating, Air Conditioning and Refrigeration
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

*Fuse or HACR circuit breaker



NOTES:

- In compliance with NEC (National Electrical Code) requirements for multi-motor and combination load equipment (refer to NEC Articles 430 and 440), the overcurrent protective device for the unit shall be fuse or HACR breaker. Canadian Standards Association (CSA) units may be fuse or circuit breaker.

2 Unbalanced 3-Phase Supply Voltage

Never operate a motor where a phase imbalance in supply voltage is greater than 2%. Use the following formula to determine the percent voltage imbalance.

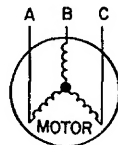
$$\% \text{ Voltage Imbalance} = 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

Example: Supply voltage is 460-3-60.

$$AB = 452 \text{ v}$$

$$BC = 464 \text{ v}$$

$$AC = 455 \text{ v}$$



$$\text{Average Voltage} = \frac{452 + 464 + 455}{3}$$

$$= \frac{1371}{3}$$

$$= 457$$

NOTE: The 575-v units are CSA only

Determine maximum deviation from average voltage

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

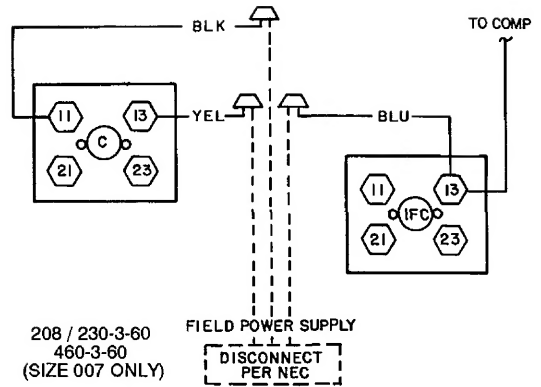
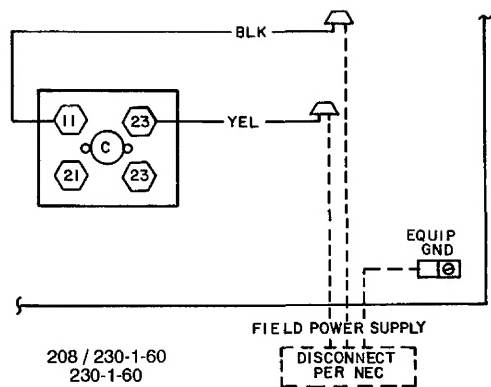
Maximum deviation is 7 v.

Determine % voltage imbalance

$$\% \text{ Voltage Imbalance} = 100 \times \frac{7}{457} = 1.53\%$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately



- LEGEND**
- C** — Contactor
 - COMP** — Compressor
 - EQUIP** — Equipment
 - GND** — Ground
 - IFC** — Indoor (Evaporator) Fan Contactor
 - NEC** — National Electrical Code

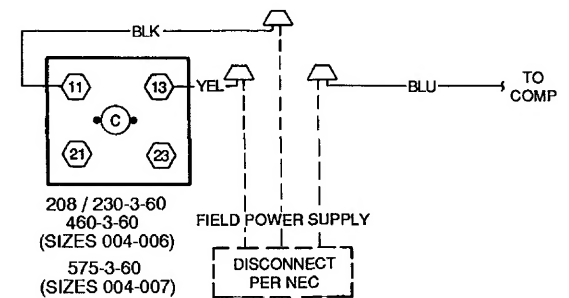
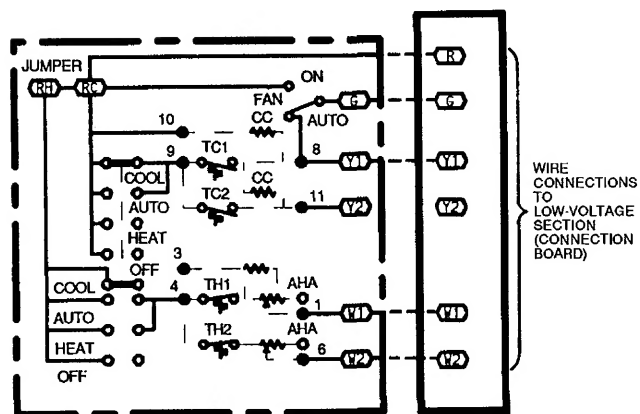


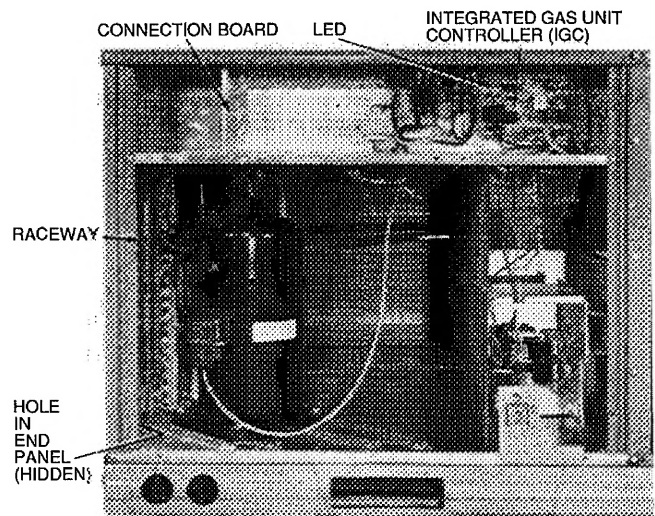
Fig. 9 — Power Wiring Connections



- LEGEND**
- AHA** — Adjustable Heat Anticipator
 - CC** — Cooling Compensator
 - TC** — Thermostat-Cooling
 - TH** — Thermostat-Heating
 - Field Wiring
 - Factory Wiring

NOTE: Connect Y2 when unit is equipped with an economizer.

Fig. 10 — Low-Voltage Connections



LED — Light-Emitting Diode

Fig. 11 — Field Control Wiring Raceway

HEAT ANTICIPATOR SETTINGS — Set heat anticipator settings at .14 amp for the first stage and .14 amp for second-stage heating, when available.

Step 8 — Make Outdoor-Air Adjustments and Install Outdoor-Air Hood

MANUAL OUTDOOR-AIR DAMPER — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit for shipping.

Assembly:

1. Determine quantity of ventilation required for building. Record amount for use in Step 8.
2. Remove and save evaporator coil access panel and screws. See Fig. 12.
3. Separate hood and screen from basepan by removing the 4 screws securing them. Save all screws.

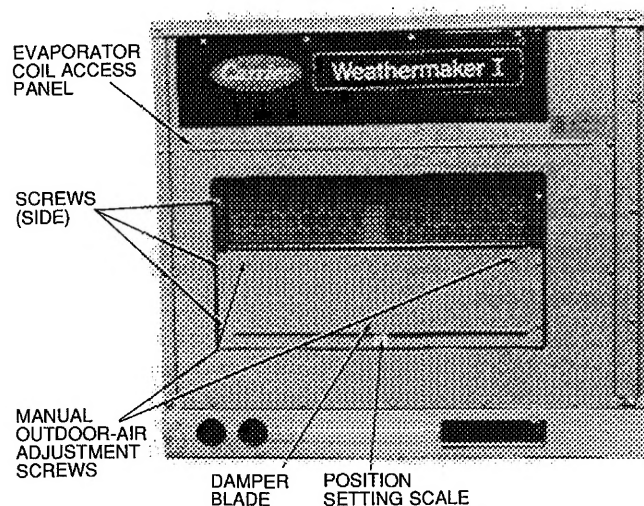


Fig. 12 — Damper Panel with Manual Outdoor-Air Damper Installed

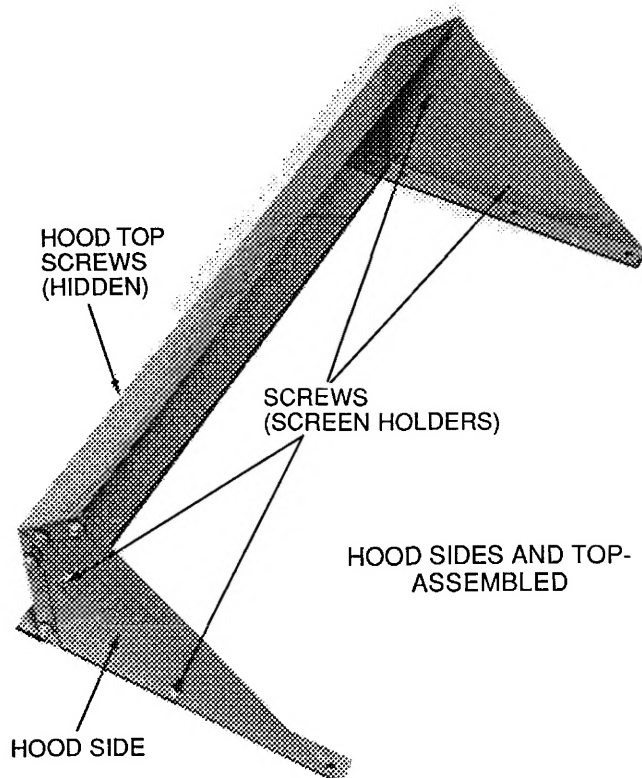


Fig. 13 — Outdoor-Air Hood Details

4. Replace evaporator coil access panel.
5. Place hood on front of evaporator coil access panel. See Fig. 13 for hood details. Secure top of hood with the 4 screws removed in Step 3. See Fig. 14.
6. Remove and save 6 screws (3 on each side) from sides of the manual outdoor-air damper.
7. Align screw holes on hood with screw holes on side of manual outdoor-air damper. See Fig. 13 and 14. Secure hood with 6 screws from Step 6.
8. Adjust minimum position setting of the damper blade by adjusting the manual outdoor air adjustment screws on the front of the damper blade. See Fig. 12. Slide blade vertically until it is in the appropriate position determined by Fig. 15. Tighten screws.
9. Remove and save screws currently on sides of hood. Insert screen. Secure screen to hood using the screws. See Fig. 14.

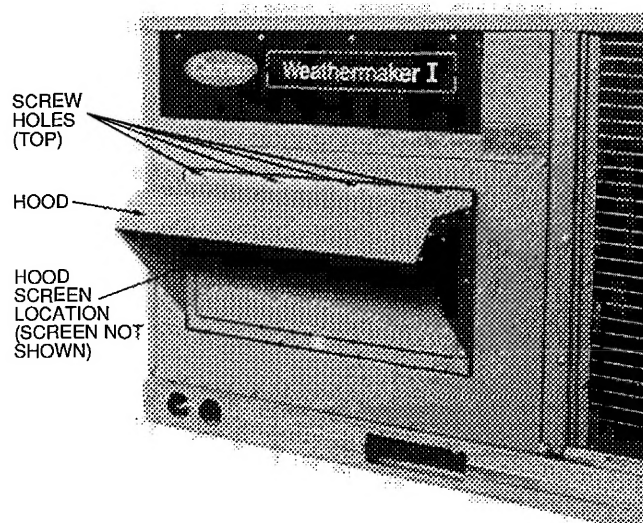


Fig. 14 — Outdoor-Air Damper with Hood Attached

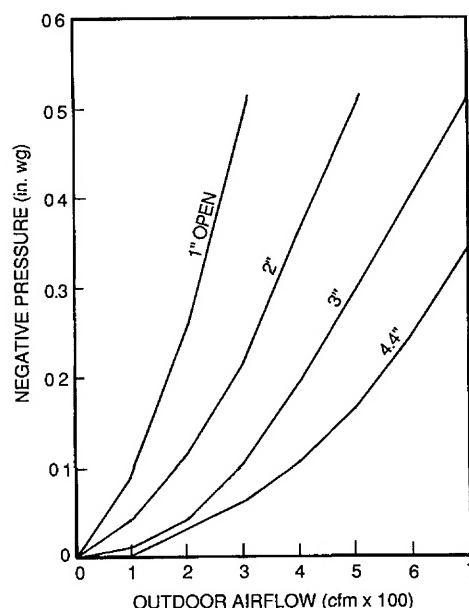


Fig. 15 — Position Setting

TWO-POSITION DAMPER — The outdoor-air hood and screen are attached to the basepan at the bottom of the unit.

Assembly:

1. Determine quantity of ventilation air required for building. Record amount of air for use in Step 9.
2. Remove and save evaporator coil access panel and screws. See Fig. 16.
3. Separate hood from basepan by removing the 4 screws securing the hood. Save screws.
4. Insert two-position damper plug from wiring harness (supplied with the unit) into the wiring harness (supplied with the two-position damper).
5. Replace evaporator coil access panel.
6. Place hood on front of evaporator coil access panel. See Fig. 13 for hood details. Secure top of hood with the 4 screws removed in Step 3. See Fig. 14.

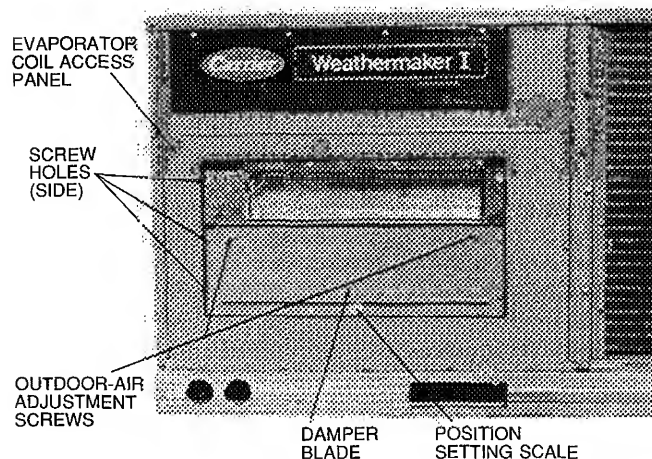


Fig. 16 — Damper Panel with Two-Position Damper Installed

7. Remove and save 6 screws (3 on each side) from sides of the two-position damper.
8. Align screw holes on hood with screw holes on side of two-position damper. See Fig. 13 and 14. Secure hood with 6 screws from Step 7.
9. Determine two-position damper setting by using Fig. 15. Set the damper panel position using the air adjustment screws. See Fig. 16. Tighten screws.
10. Remove and save 4 screws currently on sides of hood. Insert screen. Secure screen to hood using the 4 screws. See Fig. 14.

OPTIONAL ECONOMIZER — The economizer hood assembly is packaged and shipped in the filter section. Damper blades are installed at the factory and the economizer is shipped in the vertical position.

Assembly:

1. Determine quantity of ventilation air required for building. Record amount of air for use in Step 8.
2. Remove evaporator coil access panel (see Fig. 17). Save panel and screws.
3. Assemble outdoor-air hood top and side plates as shown in Fig. 18. Install seal strips on hood top and sides. Put aside screen retainer and screws for later assembly. *Do not attach hood to unit at this time.*
4. The block-off panel should be removed from the evaporator coil access panel and discarded. Save screws. See Fig. 17.

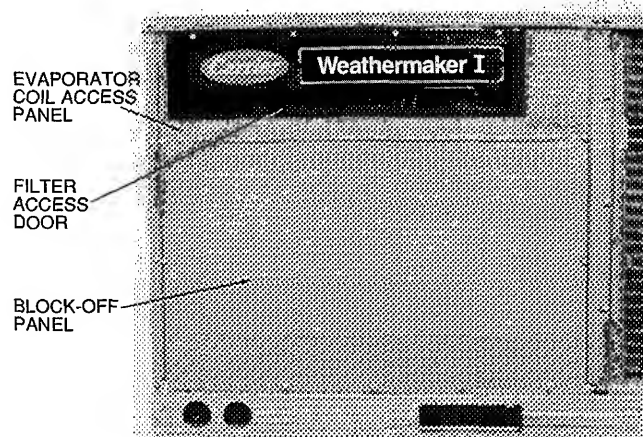
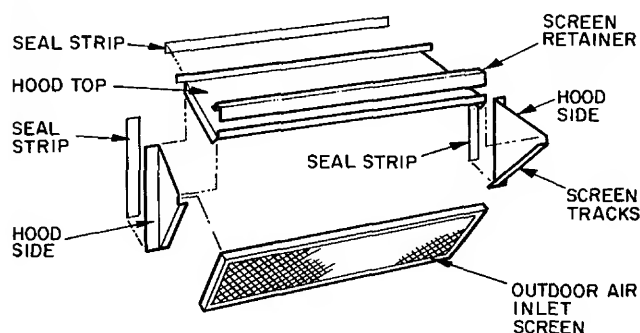
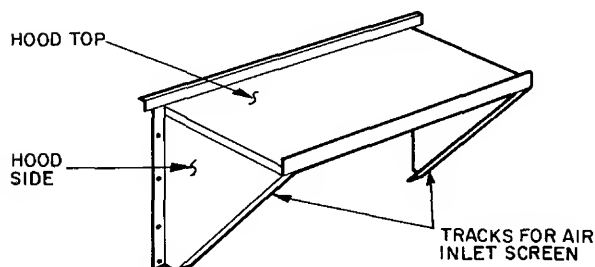


Fig. 17 — Access Panel Location



OUTDOOR AIR HOOD - UNASSEMBLED



HOOD SIDES AND TOP ASSEMBLED

Fig. 18 — Outdoor-Air Hood Details

5. Remove screws securing barometric relief damper, if desired. See Fig. 19.

6. To convert to horizontal discharge application:

- a. Remove filters from filter track.

IMPORTANT: Filters must be installed outside the unit on horizontal discharge applications with economizer. Otherwise, economizer must be partially removed to access the filters. The area of the field-installed filters should be equal to the area of the factory-installed filters.

- b. Rotate economizer 90 degrees until economizer motor faces condenser section (see Fig. 20). If necessary, disassemble economizer to replace filter.
- c. Rotate barometric relief damper 90 degrees so that it opens and closes vertically.

- d. Install horizontal discharge block-off plate over opening on the access panel. Block-off plate **MUST** be installed before installing hood assembly (see Fig. 21).

NOTE: Install spacers at the same time as the horizontal block-off plate using same screws. The spacers are used to cover gaps between the economizer assembly and the unit.

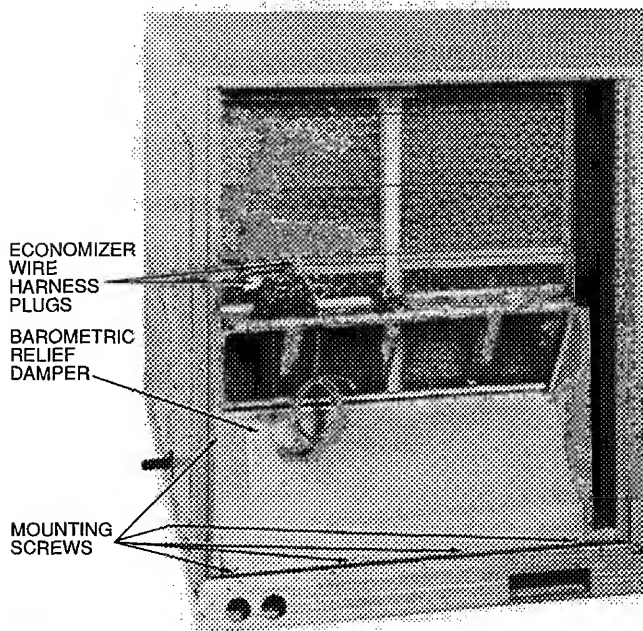
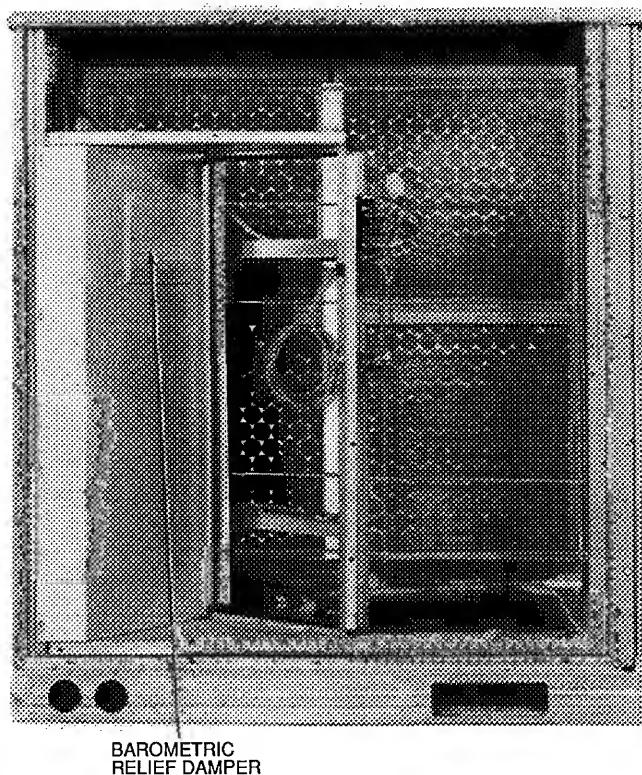


Fig. 19 — Economizer Installed in Unit



**Fig. 20 — Horizontal Economizer Installation
(90 Degree Rotation)**

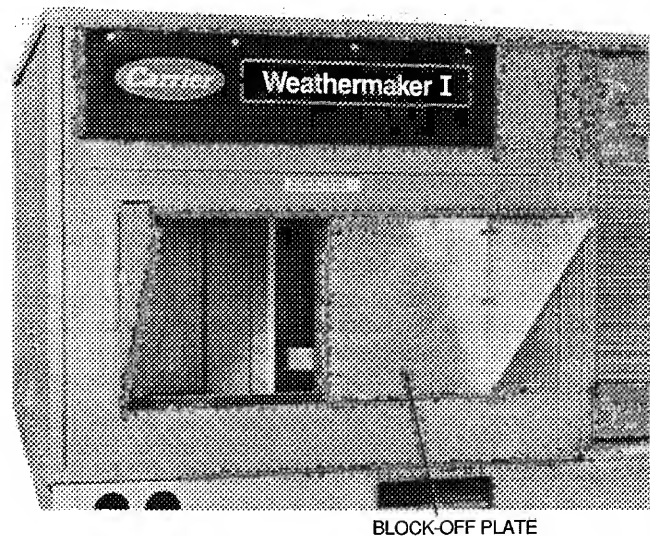
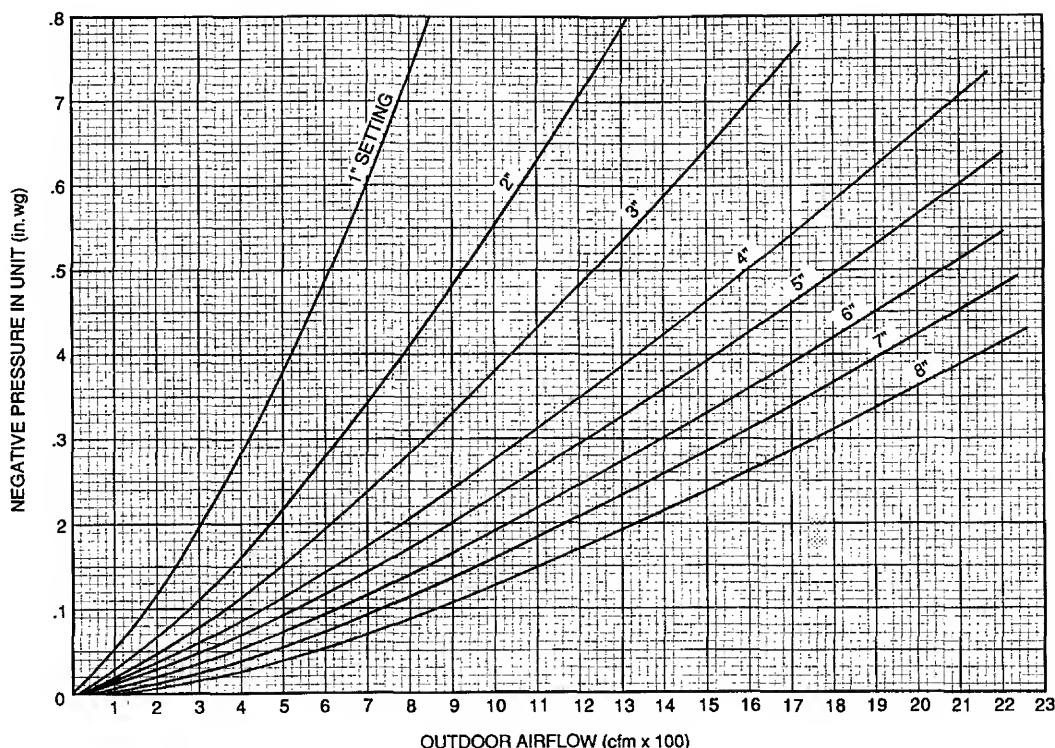


Fig. 21 — Horizontal Discharge Block-Off Plate

7. Insert economizer plug from the wiring harness (supplied with the unit) into the wiring harness plug (supplied with the economizer). See Fig. 19.
8. Determine economizer damper position setting (see Fig. 22). Adjust damper setting by adjusting screws on the position setting bracket (see Fig. 23). Slide position setting bracket until top screw (see Fig. 23) is in the position determined by Fig. 22. Tighten screws.
9. Install evaporator coil access panel with screws saved from Step 2.
10. Fasten hood top and side plate assembly to unit with screws saved from the block-off panel removal (see Fig. 18).
11. Remove tape from outdoor-air thermostat (OAT). Fasten OAT to inside of hood using screws and speed clips provided (see Fig. 24). Make sure OAT terminals are up.
12. Place knob, supplied with economizer, on OAT. Set it for 3 F below indoor room thermostat setting. If accessory solid-state enthalpy control (EC) is used instead of the OAT, see instructions shipped with EC for installation and adjustment (see Fig. 24).
13. Connect OAT per Fig. 25.
14. Slide outdoor-air inlet screens into screen track on hood side plates. While holding screens in place, fasten screen retainer to hood using screws provided.
15. Turn on base unit power.



Example:

Given —
 Return-Air Negative Static Pressure 0.2 in. wg
 Outdoor Air 900 cfm
 Determine —
 Setting = 5

Fig. 22 — Economizer Damper Minimum Position Setting

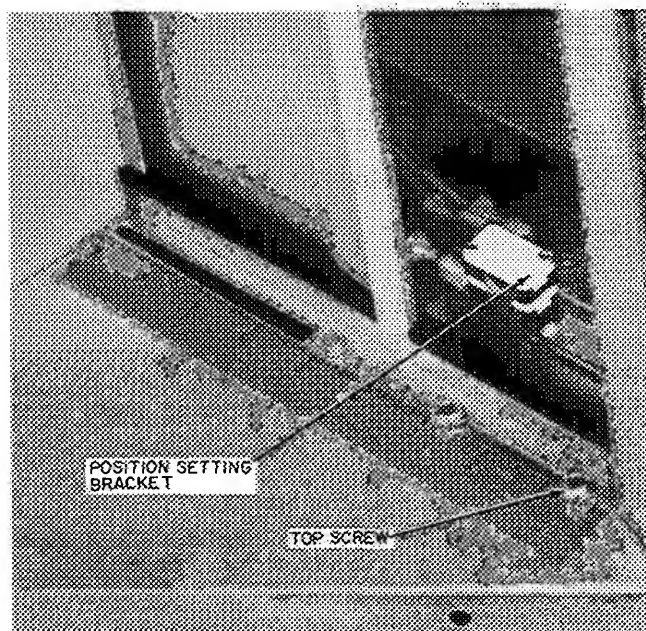


Fig. 23 — Minimum Position Damper Setting

Step 9 — Adjust Evaporator-Fan Speed — Adjust evaporator-fan speed to meet jobsite conditions. Table 3 shows fan rpm at motor pulley settings. Refer to Tables 4-15 to determine fan speed settings.

DIRECT DRIVE MOTORS — The evaporator-fan motor factory speed setting is shown on label diagram affixed to base unit. If other than factory setting is desired, refer to label diagram for motor reconnection.

BELT DRIVE MOTORS — Fan motor pulleys are factory set for speed shown in Table 1.

NOTE: Before adjusting fan speed, make sure the new fan speed will provide an air temperature rise range as shown in Table 1.

To change fan speed:

1. Shut off unit power supply.
2. Loosen belt by loosening fan motor mounting nuts. See Fig. 26.
3. Loosen movable pulley flange setscrew (see Fig. 27).
4. Screw movable flange toward fixed flange to increase speed and away from fixed flange to decrease speed. Increasing fan speed increases load on motor. Do not exceed maximum speed specified in Table 1.
5. Set movable flange at nearest keyway of pulley hub and tighten setscrew. (See Table 1 for speed change for each full turn of pulley flange.)

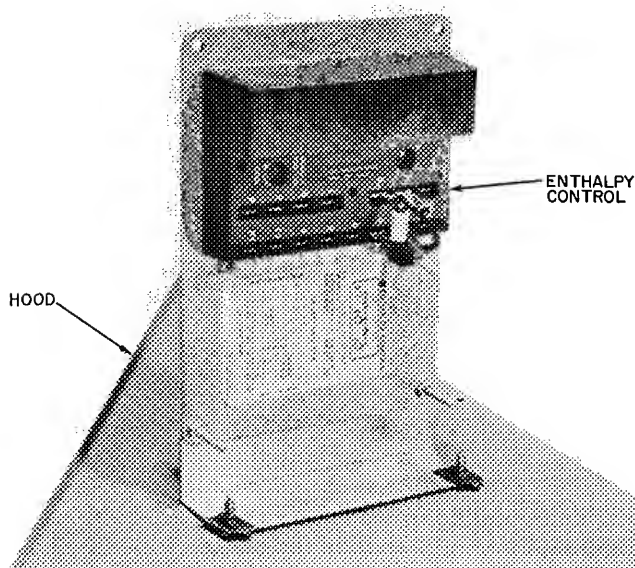
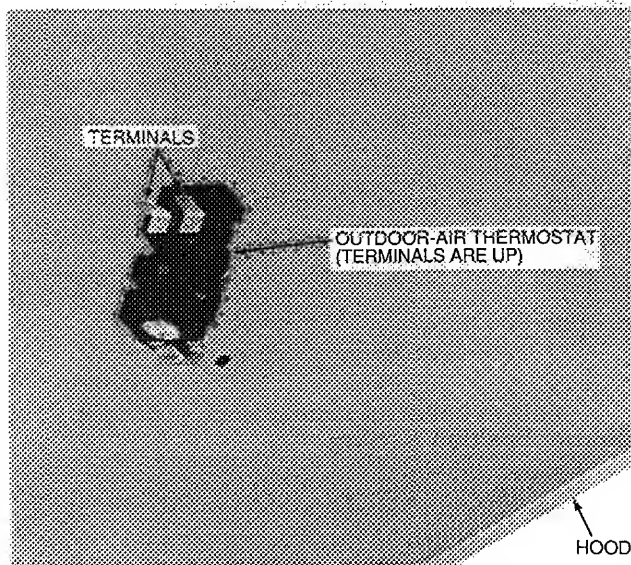
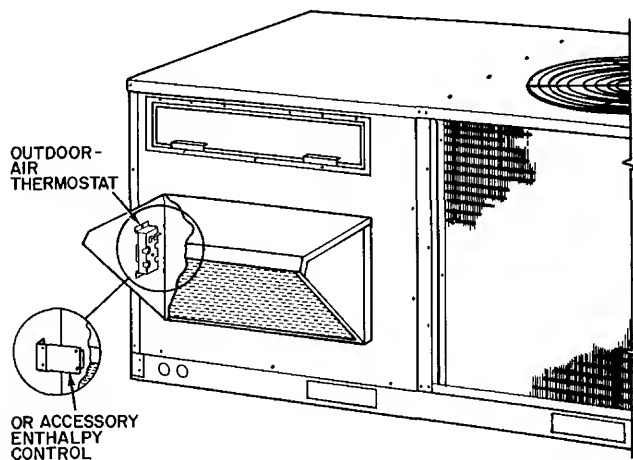


Fig. 24 – Outdoor-Air Thermostat/Enthalpy Control Installation

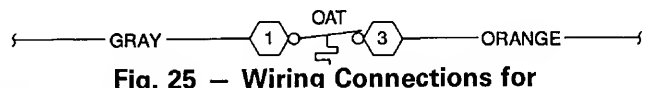


Fig. 25 – Wiring Connections for Outdoor-Air Thermostat

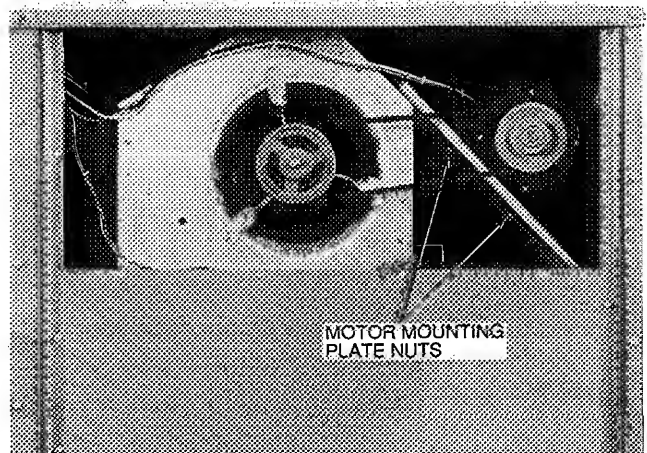


Fig. 26 – Belt Drive Motor Mounting

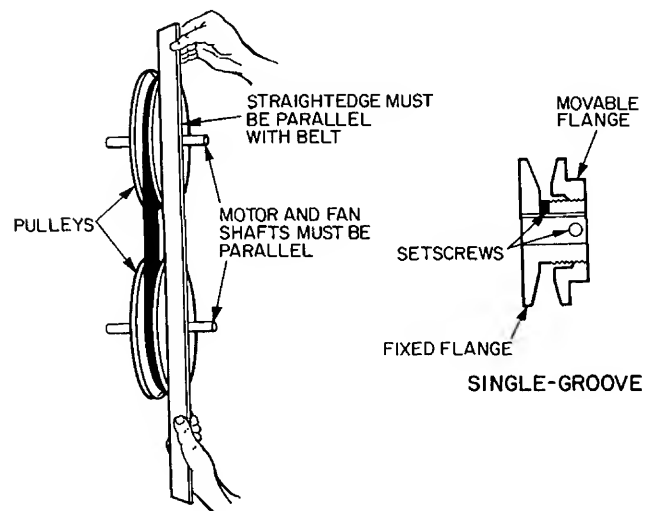


Fig. 27 – Evaporator-Fan Pulley Adjustment

To align fan and motor pulleys:

1. Loosen fan pulley setscrews.
2. Slide fan pulley along fan shaft.
3. Make angular alignment by loosening motor from mounting.

To adjust belt tension:

1. Loosen fan motor mounting nuts.
2. Slide motor mounting plate away from fan scroll for proper belt tension ($\frac{1}{2}$ -in. deflection with one finger).
3. Tighten motor mounting nuts.
4. Adjust bolt and tighten nut to secure motor in fixed position.

Table 3 – Fan Rpm at Motor Pulley Settings

UNIT 48LJD/LJE	MOTOR PULLEY TURNS OPEN										
	0	½	1	1½	2	2½	3	3½	4	4½	5
005*	1310	1285	1245	1210	1175	1140	1110	1075	1040	1005	970
006	1300	1260	1220	1180	1140	1100	1060	1020	980	940	900
007	1460	1420	1380	1340	1300	1265	1230	1190	1150	1110	1070

*Indicates alternate motor.

Table 4 – Fan Performance, 48LJE/LJF004 Vertical Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
900	0.46	0.17	0.48	0.19	0.49	0.21	0.51	0.25
1000	0.44	0.20	0.45	0.22	0.47	0.23	0.48	0.27
1100	0.40	0.21	0.42	0.24	0.44	0.25	0.45	0.29
1200	0.32	0.23	0.37	0.25	0.38	0.27	0.40	0.31
1300	0.28	0.24	0.32	0.26	0.32	0.29	0.34	0.32
1400	0.22	0.26	0.25	0.28	0.26	0.30	0.28	0.33
1500	0.16	0.27	0.18	0.33	0.20	0.31	0.21	0.34

LEGEND

Bhp — Brake Horsepower

ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils.

Table 5 – Fan Performance, 48LJE/LJF004 – Vertical Discharge Units; Alternate Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
900	0.77	0.36	0.83	0.38	0.97	0.48	1.09	0.60
1000	0.70	0.38	0.75	0.41	0.89	0.51	1.01	0.62
1100	0.62	0.41	0.66	0.45	0.80	0.53	0.92	0.64
1200	0.53	0.44	0.58	0.48	0.72	0.56	0.84	0.65
1300	0.44	0.48	0.50	0.50	0.64	0.60	0.75	0.68
1400	0.35	0.50	0.42	0.54	0.56	0.63	0.67	0.69
1500	0.25	0.53	0.33	0.58	0.47	0.65	0.58	0.72

LEGEND

Bhp — Brake Horsepower

ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils.

Table 6 — Fan Performance, 48LJD/LJE/LJF005 Vertical Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
1200	0.53	0.44	0.58	0.48	0.72	0.56	0.84	0.65
1300	0.44	0.48	0.50	0.50	0.64	0.60	0.75	0.68
1400	0.35	0.50	0.42	0.54	0.56	0.63	0.67	0.69
1500	0.25	0.53	0.33	0.58	0.47	0.65	0.58	0.72
1600	0.16	0.57	0.24	0.60	0.38	0.68	0.50	0.74
1700	0.09	0.58	0.15	0.63	0.30	0.69	0.40	0.76
1800	0.00	0.61	0.06	0.65	0.22	0.71	0.32	0.78
1900	—	—	—	—	0.12	0.73	0.24	0.79
2000	—	—	—	—	0.03	0.74	0.15	0.81

LEGEND

Bhp — Brake Horsepower
ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils.

Table 7 — Fan Performance, 48LJD/LJE/LJF005 Vertical Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		1.0		1.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1200	701	0.22	758	0.28	834	0.35	914	0.42	1012	0.56	1056	0.59	1098	0.62	1180	0.68	1255	0.76
1300	747	0.27	800	0.34	865	0.41	945	0.52	1050	0.62	1090	0.63	1132	0.68	1212	0.72	1280	0.78
1400	792	0.33	847	0.40	901	0.47	960	0.56	1091	0.67	1130	0.70	1165	0.72	1242	0.82	1310	0.89
1500	836	0.39	897	0.46	947	0.55	1000	0.61	1132	0.72	1170	0.75	1205	0.82	1275	0.91	1330	0.98
1600	881	0.47	945	0.54	983	0.62	1065	0.67	1172	0.77	1207	0.86	1238	0.92	1310	1.05	1350	1.08
1700	925	0.55	981	0.61	1020	0.68	1103	0.72	1202	0.88	1243	0.98	1270	1.05	1350	1.16	1372	1.19
1800	964	0.63	1024	0.72	1084	0.75	1140	0.82	1230	0.97	1268	1.07	1300	1.15	1390	1.29	1450	1.36
1900	1011	0.73	1068	0.79	1120	0.82	1172	0.91	1256	1.18	1310	1.13	1350	1.22	1440	1.47	1505	1.50
2000	1058	0.81	1100	0.85	1160	0.90	1237	1.20	1300	1.28	1350	1.21	1400	1.30	1460	1.57	1530	1.65

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 5.)
2. **Shaded** indicates field-supplied motor and drive required
3. *Maximum usable bhp is 1.2.* Extensive motor and electrical testing on these units ensures that the full horsepower range of the

motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils
5. Alternate motor drive range: 970 to 1310 rpm. All other rpms require field-supplied drive
6. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify.

Table 8 – Fan Performance, 48LJD/LJE/LJF006 Vertical Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	750	0.37	808	0.43	914	0.57	1001	0.70	1084	0.85	1168	1.02	1199	1.11	1126	1.02	—	—
1600	794	0.44	846	0.50	950	0.65	1034	0.78	1111	0.93	1194	1.11	1263	1.28	1275	1.35	—	—
1700	839	0.52	884	0.58	983	0.73	1068	0.88	1145	1.04	1218	1.20	1295	1.40	1351	1.57	1352	1.62
1800	885	0.61	924	0.67	1018	0.82	1105	0.99	1179	1.15	1246	1.32	1319	1.51	1389	1.72	1435	1.88
1900	932	0.72	965	0.77	1057	0.94	1143	1.12	1212	1.27	1280	1.45	1343	1.63	1415	1.85	1475	2.04
2000	979	0.83	1008	0.88	1096	1.06	1177	1.24	1247	1.41	1314	1.59	1374	1.78	1436	1.98	1500	2.21
2100	1026	0.96	1051	1.01	1136	1.19	1210	1.37	1284	1.57	1347	1.74	1409	1.94	1465	2.13	1525	2.35
2200	1074	1.10	1095	1.15	1173	1.33	1245	1.51	1322	1.73	1380	1.90	1443	2.11	1498	2.30	—	—
2300	1122	1.25	1140	1.30	1210	1.47	1284	1.67	1348	1.85	1409	2.03	1475	2.23	—	—	—	—
2400	1170	1.42	1185	1.46	1249	1.64	1323	1.85	1389	2.06	1450	2.30	—	—	—	—	—	—
2500	1218	1.61	1231	1.64	1289	1.81	1363	2.04	1424	2.24	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 6)
2. **Shaded** indicates field-supplied motor and drive required.
3. Maximum usable bhp is 1.8. Extensive motor and electrical testing on these units ensures that the full horsepower range of the

motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Standard motor drive range is 900 to 1300 rpm. All other rpms require field-supplied drive.

Table 9 – Fan Performance, 48LJD/LJE/LJF007 Vertical Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	935	0.67	983	0.75	1069	0.91	1152	1.08	1226	1.26	1294	1.45	1358	1.64	1420	1.85	1486	2.11
1900	982	0.78	1027	0.86	1111	1.03	1190	1.20	1263	1.40	1330	1.59	1392	1.79	1452	2.00	1511	2.23
2000	1029	0.90	1072	0.98	1154	1.16	1228	1.34	1301	1.54	1367	1.75	1428	1.96	1486	2.17	1542	2.39
2100	1076	1.03	1117	1.12	1197	1.31	1267	1.49	1338	1.69	1403	1.91	1464	2.13	1521	2.35	1575	2.57
2200	1124	1.18	1163	1.27	1240	1.47	1307	1.66	1376	1.86	1440	2.08	1500	2.31	1557	2.54	1610	2.77
2300	1171	1.33	1209	1.43	1283	1.64	1350	1.84	1414	2.04	1478	2.27	1533	2.51	1590	2.75	1645	2.99
2400	1219	1.51	1255	1.61	1326	1.82	1392	2.03	1453	2.24	1516	2.47	1574	2.72	1625	2.97	—	—
2500	1267	1.70	1301	1.80	1370	2.02	1435	2.25	1493	2.48	1554	2.69	1612	2.94	—	—	—	—
2600	1315	1.90	1348	2.00	1414	2.23	1478	2.47	1535	2.69	1592	2.92	—	—	—	—	—	—
2700	1363	2.12	1395	2.23	1458	2.46	1521	2.71	1577	2.94	—	—	—	—	—	—	—	—
2800	1411	2.36	1442	2.47	1505	2.71	1564	2.96	—	—	—	—	—	—	—	—	—	—
2900	1459	2.61	1489	2.72	1553	2.97	—	—	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required (See Note 6)
2. **Shaded** indicates field-supplied motor and drive required.
3. Maximum usable bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full horsepower range of the

motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Standard motor drive range is 1070 to 1460 rpm. All other rpms require field-supplied drive.

Table 10 — Fan Performance, 48LJE/LJF004 Horizontal Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
900	0.53	0.17	0.55	0.19	0.63	0.21	0.64	0.25
1000	0.48	0.20	0.51	0.22	0.57	0.23	0.60	0.27
1100	0.43	0.21	0.45	0.24	0.52	0.25	0.54	0.29
1200	0.36	0.23	0.40	0.25	0.47	0.27	0.47	0.31
1300	0.28	0.24	0.32	0.26	0.38	0.29	0.41	0.32
1400	0.20	0.26	0.24	0.28	0.31	0.30	0.32	0.33
1500	0.11	0.27	0.14	0.33	0.21	0.31	0.22	0.34

LEGEND

Bhp — Brake Horsepower

ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils

Table 11 — Fan Performance, 48LJE/LJF004 Horizontal Discharge Units; Alternate Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
900	1.05	0.36	1.12	0.39	1.17	0.47	1.26	0.58
1000	0.96	0.38	1.04	0.42	1.09	0.49	1.17	0.60
1100	0.88	0.41	0.94	0.44	1.00	0.52	1.08	0.63
1200	0.78	0.44	0.85	0.48	0.92	0.56	1.01	0.65
1300	0.70	0.48	0.76	0.50	0.84	0.60	0.94	0.68
1400	0.62	0.50	0.68	0.54	0.78	0.63	0.87	0.69
1500	0.52	0.53	0.59	0.58	0.69	0.65	0.78	0.72

LEGEND

Bhp — Brake Horsepower

ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils.

Table 12 — Fan Performance, 48LJD/LJE/LJF005 — Horizontal Discharge Units; Standard Motor (Direct)

AIRFLOW (Cfm)	LOW SPEED				HIGH SPEED			
	208		230, 460, 575		208		230, 460, 575	
	ESP	Bhp	ESP	Bhp	ESP	Bhp	ESP	Bhp
1200	0.78	0.44	0.85	0.48	0.92	0.56	1.01	0.65
1300	0.70	0.48	0.76	0.50	0.84	0.60	0.94	0.68
1400	0.62	0.50	0.68	0.54	0.78	0.63	0.87	0.69
1500	0.52	0.53	0.59	0.58	0.69	0.65	0.78	0.72
1600	0.44	0.57	0.50	0.60	0.61	0.68	0.70	0.74
1700	0.34	0.58	0.40	0.63	0.53	0.69	0.62	0.76
1800	0.22	0.61	0.30	0.65	0.45	0.71	0.54	0.78
1900	0.10	0.63	0.20	0.68	0.37	0.73	0.48	0.79
2000	—	—	0.09	0.69	0.29	0.74	0.39	0.81

LEGEND

Bhp — Brake Horsepower

ESP — External Static Pressure

NOTE: Values include losses for filters, unit casing, and wet coils.

Table 13 – Fan Performance, 48LJD/LJE/LJF005 Horizontal Discharge Units; Alternate Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.3		0.4		0.6		0.7		0.8		1.0		1.2	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1300	701	0.22	758	0.28	834	0.35	914	0.42	1012	0.56	1056	0.59	1098	0.62	1180	0.68	1255	0.76
1400	747	0.27	800	0.34	865	0.41	945	0.52	1050	0.62	1090	0.63	1132	0.68	1212	0.72	1280	0.78
1500	792	0.33	847	0.40	901	0.47	960	0.56	1091	0.67	1130	0.70	1165	0.72	1242	0.82	1310	0.89
1600	836	0.39	897	0.46	947	0.55	1000	0.61	1132	0.72	1170	0.75	1205	0.82	1275	0.91	1330	0.98
1700	881	0.47	945	0.54	983	0.62	1065	0.67	1172	0.77	1207	0.86	1238	0.92	1310	1.05	1350	1.08
1800	925	0.55	981	0.61	1020	0.68	1103	0.72	1202	0.88	1243	0.98	1270	1.05	1350	1.16	1372	1.19
1900	964	0.63	1024	0.72	1084	0.75	1140	0.82	1230	0.97	1268	1.07	1300	1.15	1350	1.25	1350	1.25
2000	1011	0.73	1068	0.79	1120	0.82	1172	0.91	1256	1.18	1310	1.13	1350	1.15	1350	1.15	1350	1.15
2100	1058	0.81	1100	0.85	1160	0.90	1237	1.20	1300	1.25	1350	1.25	1350	1.25	1350	1.25	1350	1.25

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required (See Note 5)
2. **Shaded** indicates field-supplied motor and drive required
3. Maximum usable bhp is 1.2. Extensive motor and drive testing on these units ensures that the full horsepower range of the

motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils.
5. Alternate motor drive range: 970 to 1310 rpm. All other rpms require field-supplied drive.
6. Use of field-supplied motor may affect wire sizing. Contact Carrier representative to verify

Table 14 – Fan Performance, 48LJD/LJE/LJF006 Horizontal Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1500	720	0.34	776	0.39	886	0.53	978	0.66	1059	0.80	1142	0.96	1207	1.11	1245	1.20	1251	1.21
1600	760	0.40	814	0.46	915	0.59	1010	0.74	1089	0.89	1165	1.04	1240	1.22	1296	1.37	1329	1.46
1700	801	0.47	853	0.54	950	0.68	1044	0.84	1120	0.99	1190	1.14	1266	1.33	1331	1.50	1381	1.65
1800	842	0.55	891	0.62	985	0.77	1075	0.94	1151	1.09	1221	1.26	1287	1.42	1358	1.63	1372	1.67
1900	883	0.64	931	0.72	1019	0.87	1103	1.03	1184	1.21	1252	1.38	1315	1.55	1380	1.74	1440	1.90
2000	924	0.74	970	0.82	1054	0.97	1134	1.14	1217	1.34	1283	1.51	1346	1.69	1405	1.85	1460	2.00
2100	965	0.85	1010	0.93	1090	1.09	1170	1.27	1247	1.47	1315	1.65	1377	1.82	1435	2.00	1485	2.16
2200	1007	0.97	1050	1.06	1128	1.22	1205	1.40	1275	1.59	1340	1.81	1400	2.00	1455	2.16	1500	2.30
2300	1049	1.10	1090	1.19	1166	1.36	1239	1.55	1306	1.74	1365	1.94	1420	2.16	1475	2.30	1520	2.40
2400	1090	1.24	1131	1.34	1204	1.51	1273	1.70	1330	1.90	1385	2.10	1440	2.30	1495	2.40	1540	2.50
2500	1132	1.39	1172	1.49	1243	1.68	1300	1.85	1355	2.05	1410	2.25	1465	2.40	1520	2.50	1565	2.60

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required (See Note 6.)
2. **Shaded** indicates field-supplied motor and drive required
3. Maximum usable bhp is 1.8. Extensive motor and electrical testing on these units ensures that the full horsepower range of

the motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify
6. Motor drive range is 900 to 1300 rpm. All other rpms require field-supplied drive.

Table 15 – Fan Performance, 48LJD/LJE/LJF007 Horizontal Discharge Units; Standard Motor (Belt)

AIRFLOW (Cfm)	EXTERNAL STATIC PRESSURE (in. wg)																	
	0.1		0.2		0.4		0.6		0.8		1.0		1.2		1.4		1.6	
	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp	Rpm	Bhp
1800	852	0.55	905	0.62	1002	0.78	1084	0.93	1163	1.10	1235	1.29	1303	1.48	1371	1.69	1433	1.90
1900	894	0.64	945	0.72	1037	0.88	1119	1.04	1194	1.21	1266	1.40	1330	1.59	1396	1.81	1450	2.03
2000	936	0.74	984	0.82	1072	0.98	1154	1.16	1226	1.33	1297	1.53	1362	1.73	1422	1.94	1485	2.16
2100	978	0.85	1024	0.93	1108	1.10	1190	1.29	1259	1.47	1327	1.66	1393	1.87	1452	2.08	1510	2.31
2200	1021	0.97	1064	1.05	1145	1.22	1225	1.43	1294	1.62	1359	1.81	1423	2.02	1483	2.24	1535	2.40
2300	1064	1.10	1104	1.18	1183	1.36	1260	1.57	1330	1.78	1392	1.97	1454	2.18	1515	2.40	1565	2.64
2400	1107	1.24	1145	1.32	1222	1.52	1296	1.73	1365	1.94	1426	2.15	1485	2.36	1544	2.59	1600	2.84
2500	1150	1.39	1186	1.48	1262	1.68	1331	1.89	1400	2.12	1461	2.34	1518	2.55	1575	2.75	—	—
2600	1193	1.56	1228	1.65	1301	1.86	1367	2.07	1435	2.31	1497	2.54	1552	2.76	1607	2.96	—	—
2700	1237	1.74	1269	1.83	1341	2.05	1404	2.26	1471	2.51	1532	2.75	1587	2.95	—	—	—	—
2800	1280	1.94	1311	2.03	1381	2.25	1442	2.47	1500	2.72	1557	2.96	—	—	—	—	—	—
2900	1324	2.15	1354	2.24	1422	2.46	1481	2.69	1542	2.94	—	—	—	—	—	—	—	—
3000	1368	2.37	1398	2.46	1465	2.68	1524	2.93	—	—	—	—	—	—	—	—	—	—

LEGEND

Bhp — Brake Horsepower

NOTES:

1. **Boldface** indicates field-supplied drive required. (See Note 6.)
2. **Shaded** indicates field-supplied motor and drive required.
3. Maximum usable bhp is 2.4. Extensive motor and electrical testing on these units ensures that the full horsepower range of

the motor can be utilized with confidence. Using your fan motors up to the horsepower ratings shown will not result in nuisance tripping or premature motor failure. Unit warranty will not be affected.

4. Values include losses for filters, unit casing, and wet coils.
5. Use of a field-supplied motor may affect wire sizing. Contact Carrier representative to verify.
6. Motor drive range is 1070 to 1460 rpm. All other rpms require field-supplied drive.

START-UP

IMPORTANT: Energize crankcase heater 24 hours prior to base unit start-up to remove absorbed refrigerant from oil to prevent damage to compressor. Heater is energized as long as there is power to the unit.

Unit Preparation — Make sure that unit has been installed in accordance with these installation instructions and applicable codes.

Return-Air Filters — Make sure correct filters are installed in filter tracks. See Table 1. Do not operate unit without return-air filters.

Compressor Mounting — Compressors are internally spring mounted. Do not loosen or remove compressor holddown bolts.

Internal Wiring — Check all electrical connections in unit control boxes. Tighten as required.

Refrigerant Service Ports — Each unit system has 3 Schrader-type service gage ports: one on the suction line, one on the liquid line, and one on the compressor discharge line. Be sure that caps on the ports are tight. One Schrader-type valve is located under both the high-pressure switch and the low-pressure switch.

Cooling — Set space thermostat to OFF position. To start unit, turn on main power supply. Set system selector switch at COOL position and fan switch at AUTO. position. Adjust thermostat to a setting below room temperature. Compressor starts on closure of contactor.

Check unit charge. Refer to Service, Refrigerant Charge section, page 22.

Reset thermostat at a position above room temperature. Compressor will shut off. Evaporator fan will shut off after 30 second delay.

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting thermostat at a position above room temperature shuts unit off temporarily until space temperature exceeds thermostat setting.

Main Burners — Main burners are factory set and should require no adjustment.

TO CHECK ignition of main burners and heating controls, move thermostat set point above room temperature and verify that the burners light and evaporator fan is energized. After ensuring that the unit continues to heat the building, lower the thermostat setting below room temperature and verify that the burners and evaporator fan turn off. (Fan will turn off only if fan selector switch is in the AUTO. position.)

Refer to Table 16 for the correct orifice to use at high altitudes.

Heating

1. Purge gas supply line of air by opening union ahead of gas valve. If gas odor is detected, tighten union and wait 5 minutes before proceeding.
2. Turn on electrical supply and manual gas valve.
3. Set system switch selector at HEAT position and fan switch at AUTO. or ON position. Set heating temperature lever above room temperature.
4. The induced draft motor will start.
5. After a call for heating, the main burners should light within 5 seconds. If the burner does not light, then there is a 22 second delay before another 5-second try. If the

burner still does not light, the time delay is repeated. If the burner does not light within 15 minutes, there is a lockout. To reset the control, break the 24 v power to W1.

6. The evaporator-fan motor will turn on 45 seconds after the burners are ignited.
7. The evaporator-fan motor will turn off 45 seconds after thermostat temperature is satisfied.
8. Adjust airflow to obtain a temperature rise within the range specified on the unit nameplate.

NOTE: The default value for the evaporator-fan motor ON and OFF delay is 45 seconds. The Integrated Gas Unit Controller (IGC) modifies this value when abnormal limit switch cycles occur. Based upon unit operating conditions, the ON delay can be reduced to 0 seconds and the OFF delay can be extended to 180 seconds.

Table 16 — Altitude Compensation*

ELEVATION (ft)	74,000 AND 115,000 BTUH NOMINAL INPUT		150,000 BTUH NOMINAL INPUT	
	Natural Gas Orifice Size†	Liquid Propane Orifice Size†	Natural Gas Orifice Size†	Liquid Propane Orifice Size†
0-2,000	33	43	30	38
2,000	34	43	30	39
3,000	35	44	31	40
4,000	36	44	32	41
5,000	36	44	33	42
6,000	37	45	34	43
7,000	37	45	35	43
8,000	38	46	36	44
9,000	39	47	37	44
10,000	41	48	38	45
11,000	43	48	39	45
12,000	44	49	40	46
13,000	44	49	41	47
14,000	45	50	42	47

*As the height above sea level increases, there is less oxygen per cubic foot of air. Therefore, heat input rate should be reduced at higher altitudes.

†Orifices available through your Carrier distributor

TO SHUT OFF UNIT — Set system selector switch at OFF position. Resetting heating selector lever below room temperature will temporarily shut unit off until space temperature falls below thermostat setting.

Safety Relief — A soft solder joint at the suction service Schrader port provides pressure relief under abnormal temperature and pressure conditions (i.e., fire in building).

Ventilation (Continuous Fan) — Set fan and system selector switches at ON and OFF positions, respectively. Evaporator fan operates continuously to provide constant air circulation. When the evaporator-fan selector switch is turned to the OFF position, there is a 30 second delay before the fan turns off.

Operating Sequence

COOLING, UNITS WITHOUT ECONOMIZER — When thermostat calls for cooling, terminals G and Y1 are energized, and the indoor (evaporator) fan motor (IFM), compressor, and outdoor (condenser) fan motor (OFM) start. The OFM runs continuously while the unit is in cooling. When the thermostat is satisfied, C is deenergized and the compressor and OFM shut off. After a 30 second delay, the IFM shuts off. If the thermostat fan selector switch is in the ON position, the evaporator motor will run continuously.

HEATING, UNITS WITHOUT ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45 second time-off delay.

COOLING, UNITS WITH ECONOMIZER — When the outdoor-air temperature is above the outdoor-air thermostat (OAT) setting and the room thermostat calls for cooling, compressor contactor is energized to start compressor and the outdoor (condenser) fan motor (OFM). The indoor (evaporator) fan motor (IFM) is energized and the economizer damper moves to the minimum position. After the thermostat is satisfied, there is a 30 second delay before the evaporator fan turns off. The damper then moves to the fully closed position. When using continuous fan, the damper moves to the minimum position.

When the outdoor-air temperature is below the OAT setting and the thermostat calls for cooling, the economizer damper moves to the minimum position. If the supply-air temperature is above 57 F, the damper continues to open until it reaches the fully open position or until the supply-air temperature drops below 52 F.

When the supply-air temperature falls between 57 F and 52 F, the damper will remain at an intermediate open position. If the supply-air temperature falls below 52 F, the damper will modulate closed until it reaches the minimum position or until the supply-air temperature is above 52 F. When the thermostat is satisfied, the damper moves to the fully closed position when using AUTO fan or to the minimum position when using continuous fan.

If the outdoor air alone cannot satisfy the cooling requirements of the conditioned space, economizer cooling is integrated with mechanical cooling, providing two stages of cooling. Compressor and the condenser fan will be energized and the position of the economizer damper will be determined by the supply-air temperature. When the second stage of cooling is satisfied, the compressor and OFM will be deenergized. The damper position will be determined by the supply-air temperature. When the first stage of cooling is satisfied, there is a 30 second delay before the evaporator fan shuts off. The damper then moves to the fully closed position. When using a continuous fan, the damper moves to the minimum position.

HEATING, UNITS WITH ECONOMIZER — When the thermostat calls for heating, terminal W1 is energized. To prevent thermostat short-cycling, the unit is locked into the Heating mode for at least 1 minute when W1 is energized. The induced-draft motor is energized and the burner ignition sequence begins. The indoor (evaporator) fan motor (IFM) is energized 45 seconds after a flame is ignited and the damper moves to the minimum position. On units equipped for two stages of heat, when additional heat is needed, W2 is energized and the high-fire solenoid on the main gas valve (MGV) is energized. When the thermostat is satisfied and W1 is deenergized, the IFM stops after a 45 second time-off delay. The economizer damper then moves to the fully closed position. When using continuous fan, the damper will remain in the minimum position.

SERVICE

⚠ CAUTION

When servicing unit, shut off all electrical power to unit to avoid shock hazard or injury from rotating parts.

Cleaning — Inspect unit interior at the beginning of heating and cooling season and as operating conditions require.

EVAPORATOR COIL

1. Turn unit power off. Remove evaporator coil access panel.
2. If economizer is installed, remove economizer by disconnecting Molex plug and removing economizer mounting screws. Refer to accessory economizer installation instructions or Optional Economizer section on page 11 for more details.
3. Slide filters out of unit.
4. Clean coil using a commercial coil cleaner or dishwasher detergent in a pressurized spray canister. Wash both sides of coil and flush with clean water. For best results, backflush toward return-air section to remove foreign material. Flush condensate pan after completion.
5. Reinstall economizer and filters.
6. Reconnect wiring.
7. Replace access panels.

CONDENSER COIL — Inspect coil monthly. Clean condenser coil annually, and as required by location and outdoor air conditions.

One-Row Coils — Wash coil with commercial coil cleaner. It is not necessary to remove top panel.

2-Row Coils

Clean coil as follows:

1. Turn off unit power.
2. Remove top panel screws on condenser end of unit.
3. Remove condenser coil corner post. See Fig. 28. To hold top panel open, place coil corner post between top panel and center post. See Fig. 29.
4. Remove screws securing coil to center post.
5. Remove fastener holding coil sections together at return end of condenser coil. Carefully separate the outer coil section 3 to 4 in. from the inner coil section. See Fig. 30.
6. Use a water hose or other suitable equipment to flush down between the 2 coil sections to remove dirt and debris. Clean the outer surfaces with a stiff brush in the normal manner.
7. Secure inner and outer coil rows together with a field-supplied fastener.
8. Reposition the outer coil section and remove the coil corner post from between the top panel and center post. Reinstall the coil corner post and replace all screws.

CONDENSATE DRAIN — Check and clean each year at start of cooling season. In winter, keep drain dry or protect against freeze-up.

FILTERS — Clean or replace at start of each heating and cooling season, or more often if operating conditions require it. Replacement filters must be same dimensions as original filters.

OUTDOOR-AIR INLET SCREENS — Clean screens with steam or hot water and a mild detergent. Do not use disposable filters in place of screens.

Lubrication

COMPRESSORS — Each compressor is charged with the correct amount of oil at the factory.

FAN MOTOR BEARINGS — Fan motor bearings are of the permanently lubricated type. No further lubrication is required. No lubrication of condenser or evaporator fan motors is required.

Manual Outdoor-Air Damper — If outdoor-air damper blade adjustment is required, see Manual Outdoor-Air Damper section on page 10.

Two-Position Damper — Refer to Two-Position Damper section on page 11.

Economizer Adjustment — Refer to Optional Economizer section on page 11.

Condenser-Fan Adjustment (Fig. 31) — Shut off unit power supply. Remove condenser-fan assembly (grille, motor, motor cover, and fan) and loosen fan hub setscrews. Adjust fan height as shown in Fig. 31. Tighten setscrews and replace condenser-fan assembly.

Refrigerant Charge — Amount of refrigerant charge is listed on unit nameplate (also refer to Table 1). Refer to Carrier GTAC2-5 Charging, Recovery, Recycling, and Reclamation training manual and the following procedures.

Unit panels must be in place when unit is operating during charging procedure.

NO CHARGE — Use standard evacuating techniques. After evacuating system, weigh in the specified amount of refrigerant. (Refer to Table 1.)

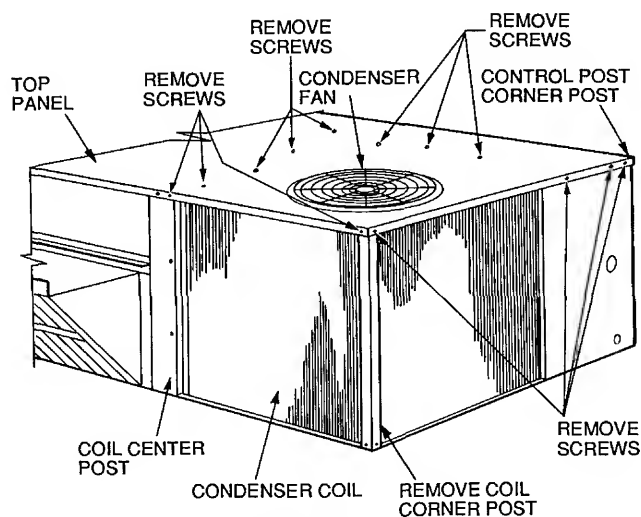


Fig. 28 — Cleaning Condenser Coil

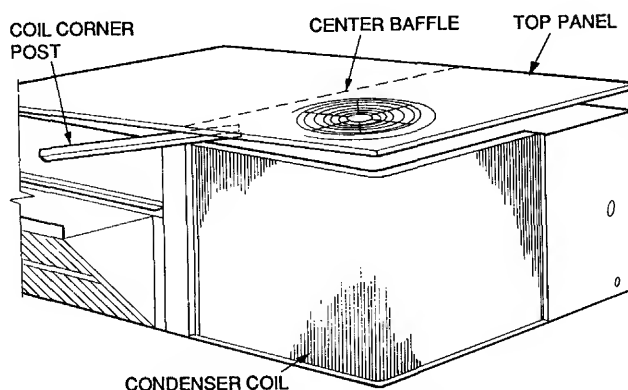


Fig. 29 — Propping Up Top Panel

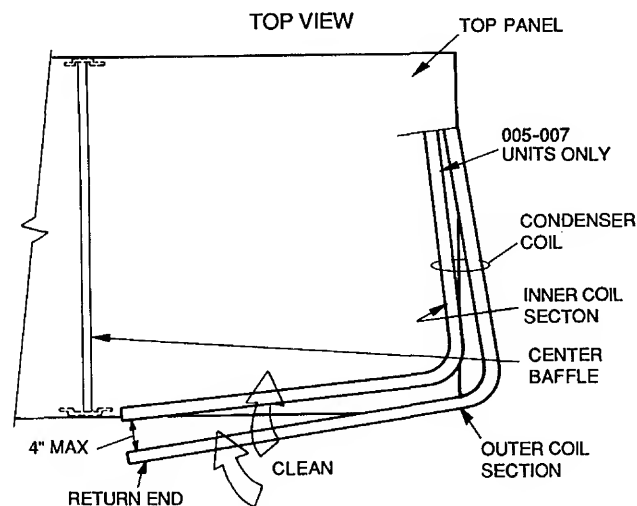


Fig. 30 — Separating Coil Sections

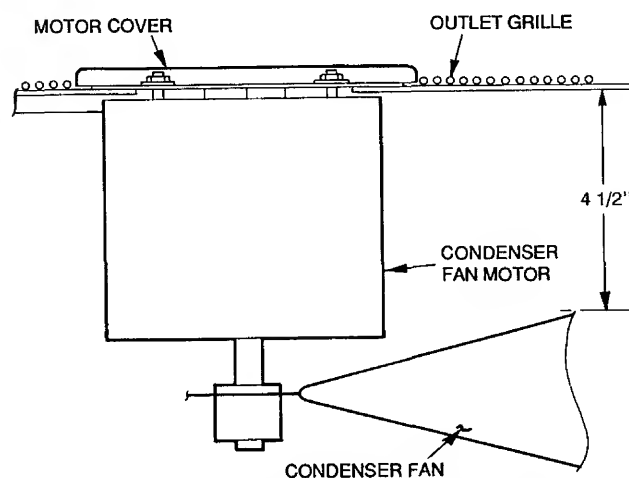


Fig. 31 — Condenser-Fan Adjustment

LOW CHARGE COOLING — Using Cooling Charging Charts, Fig. 32-35, vary refrigerant until the conditions of the appropriate chart are met. Note the charging charts are different from type normally used. Charts are based on charging the units to the correct superheat for the various operating conditions. Accurate pressure gage and temperature sensing device are required. Connect the pressure gage to the service port on the suction line. Mount the temperature sensing device on the suction line and insulate it so that outdoor ambient temperature does not affect the reading. Indoor-air cfm must be within the normal operating range of the unit.

TO USE COOLING CHARGING CHART — Take the outdoor ambient temperature and read the suction pressure gage.

Refer to chart to determine what suction temperature should be. If suction temperature is high, add refrigerant. If suction temperature is low, carefully reclaim some of the charge. Recheck the suction pressure as charge is adjusted.

Example: (Fig. 33)

Outdoor Temperature 85 F
Suction Pressure 70 psig
Suction Temperature should be 46 F
(Suction Temperature may vary 5 F.)

If Chargemaster® charging device is used, temperature and pressure readings must be accomplished using the charging chart.

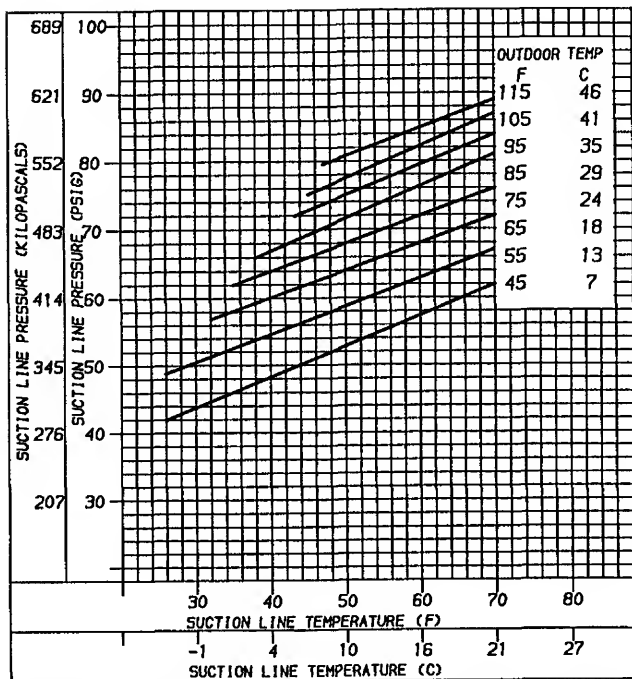


Fig. 32 — Cooling Charging Chart, 48LJE/LJF004

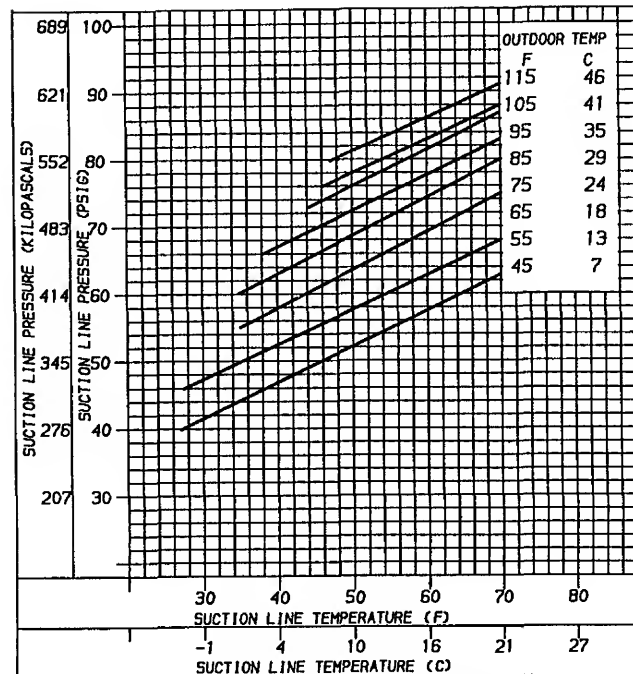


Fig. 34 — Cooling Charging Chart, 48LJD/LJE/LJF006

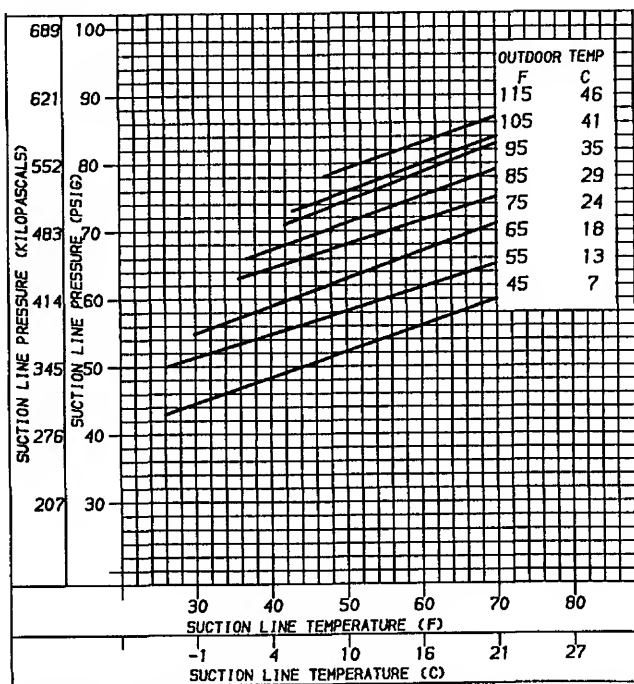


Fig. 33 — Cooling Charging Chart, 48LJD/LJE/LJF005

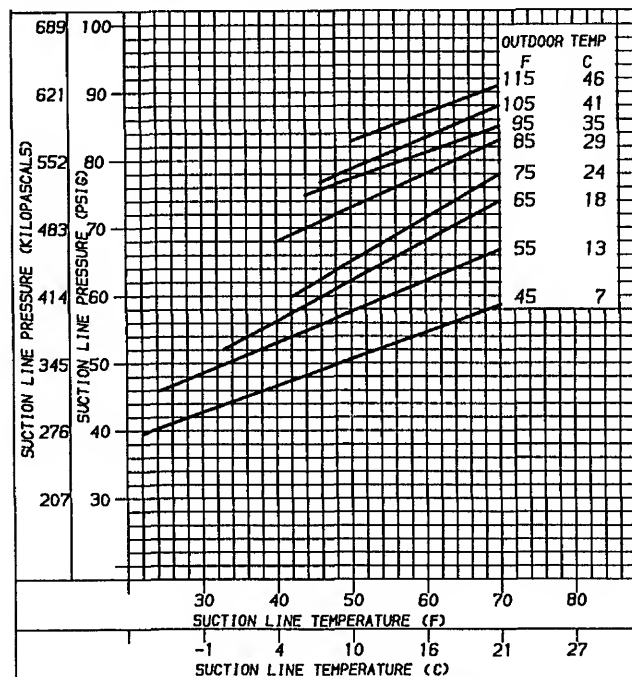


Fig. 35 — Cooling Charging Chart, 48LJD/LJE/LJF007

Flue Gas Passageways — To inspect the flue collector box and upper areas of the heat exchanger:

1. Remove the combustion blower wheel and motor assembly according to directions in Combustion-Air Blower section below.
2. Remove the 3 screws holding the blower housing to the flue cover.
3. Remove the flue cover to inspect the heat exchanger.
4. Clean all surfaces as required using a wire brush.

Combustion-Air Blower — Clean periodically to assure proper airflow and heating efficiency. Inspect blower wheel every fall and periodically during heating season. For the first heating season, inspect blower wheel bimonthly to determine proper cleaning frequency.

To inspect blower wheel, remove draft hood and screen. Shine a flashlight into opening to inspect wheel. If cleaning is required, remove motor and wheel as follows:

1. Slide burner access panel out.
2. Remove the 2 screws which hold the heat shield in place, and remove heat shield.
3. Remove the 7 screws that attach induced-draft motor mounting plate to blower housing (Fig. 36).
4. Slide the motor and blower wheel assembly out of the blower housing. The blower wheel can be cleaned at this point. If additional cleaning is required, continue with Steps 5 and 6.
5. To remove blower from the motor shaft, remove 2 set-screws.
6. To remove motor, remove the 4 screws that hold the motor to mounting plate. Remove the motor cooling fan by removing one setscrew. Then remove nuts that hold motor to mounting plate.
7. To reinstall, reverse the procedure outlined above.

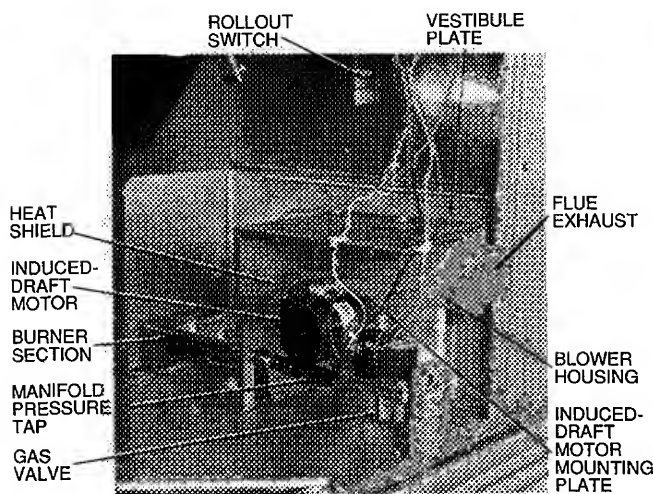


Fig. 36 — Burner Section Details

Limit Switch — Remove blower access panel (Fig. 6). Limit switch is located on the fan deck.

Burner Ignition — Unit is equipped with a direct spark ignition 100% lockout system. Integrated Gas Unit Controller (IGC) is located in the control box (Fig. 11). IGC contains a self-diagnostic LED (light-emitting diode). A single LED on the IGC provides a visual display of operational or sequential problems when the power supply is interrupted. When a break in power occurs, the IGC will be reset (resulting in a loss of fault history) and the indoor (evaporator) fan ON/OFF times will be reset. The LED

error code can be observed through the viewport. During servicing refer to the label on the control box cover or Table 17 for an explanation of LED error code descriptions.

If lockout occurs, unit may be reset by interrupting power supply to unit for at least 5 seconds.

Table 17 — LED Error Code Description*

LED INDICATION	ERROR CODE DESCRIPTION
ON	Normal Operation
OFF	Hardware Failure
1 Flash†	Evaporator Fan On/Off Delay Modified
2 Flashes	Limit Switch Fault
3 Flashes	Flame Sense Fault
4 Flashes	4 Consecutive Limit Switch Faults
5 Flashes	Ignition Lockout Fault
6 Flashes	Induced-Draft Motor Fault
7 Flashes	Rollout Switch Fault
8 Flashes	Internal Control Fault

LED — Light-Emitting Diode

*A 3 second pause exists between LED error code flashes. If more than one error code exists, all applicable codes will be displayed in numerical sequence

†Indicates a code that is not an error. The unit will continue to operate when this code is displayed.

IMPORTANT: Refer to Troubleshooting Tables 19-22 for additional information.

Main Burners — At the beginning of each heating season, inspect for deterioration or blockage due to corrosion or other causes. Observe the main burner flames and adjust, if necessary.

⚠ CAUTION

When working on gas train, do not hit or plug orifice spuds.

REMOVAL OF GAS TRAIN (Fig. 36 and 37)

1. Shut off manual gas valve.
2. Shut off power to unit.
3. Remove compressor access panel (not shown).
4. Slide out burner section side panel (not shown).
5. Remove heat shield.
6. Disconnect gas piping at unit gas valve.
7. Remove wires connected to gas valve. Mark each wire.
8. Remove induced-draft motor, ignitor, and sensor wires at the Integrated Gas Unit Controller (IGC) (see Fig. 11).
9. Remove the 2 screws that attach the burner rack to the vestibule plate.
10. Remove the gas valve bracket.
11. Slide the burner tray out of the unit (Fig. 37).
12. To reinstall, reverse the procedure outlined above.

CLEANING AND ADJUSTMENT

1. Remove burner rack from unit as described in Removal of Gas Train section, above.
2. Inspect burners; if dirty, remove burners from rack.
3. Using a soft brush clean burners and cross-over port as required.
4. Adjust spark gap. See Fig. 38.
5. Reinstall burners on rack.
6. Reinstall burner rack as described in Replacement of Gas Train section, above.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

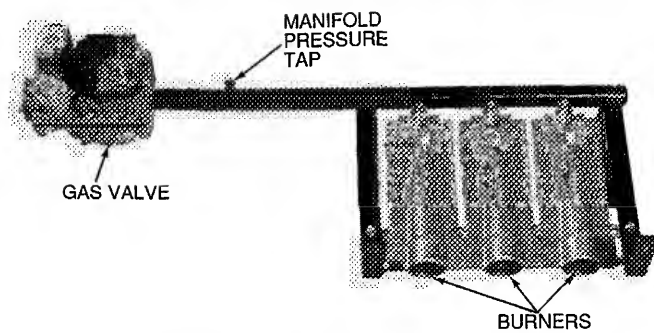
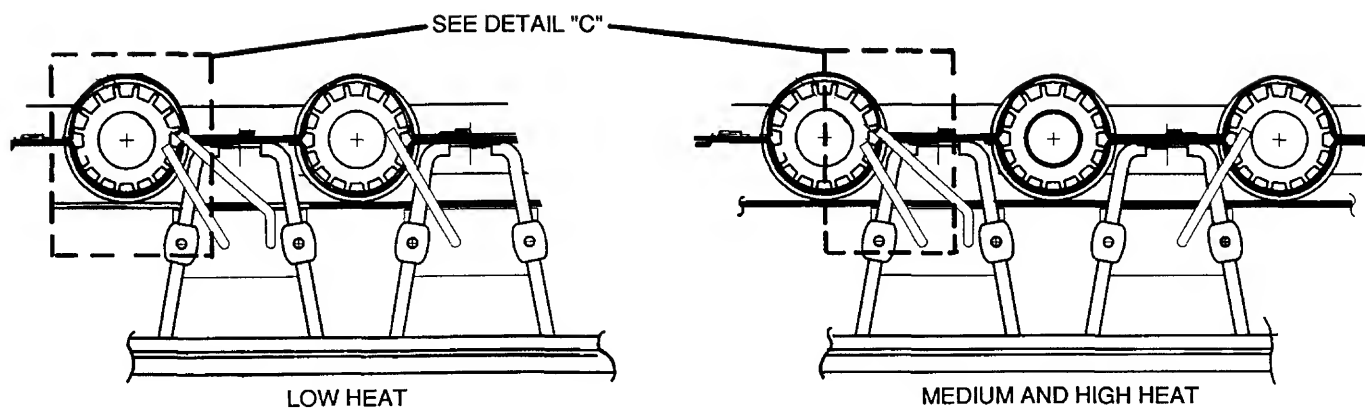
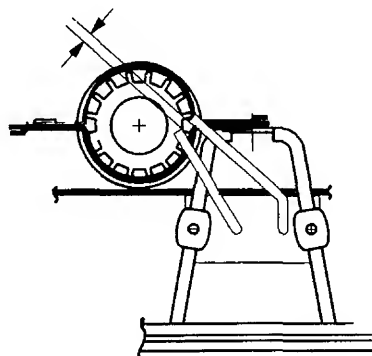


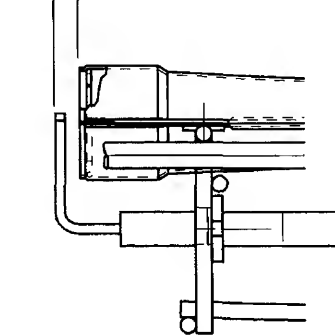
Fig. 37 - Burner Tray Details



SPARK GAP .125" TO .140"



SPARK GAP .142" TO .220"



DETAIL "C"

Fig. 38 - Spark Adjustment

TROUBLESHOOTING

Table 18 — LED Error Code Service Analysis

PROBLEM	CAUSE	REMEDY
Hardware failure. (LED 2 flashes)	Loss of power to control module (IGC).	Check 5 amp fuse on IGC, power to unit, 24 v circuit breaker, and transformer. Units without a 24 v circuit breaker have an internal overload in the 24 v transformer. If the overload trips, allow 10 minutes for automatic reset.
Limit switch fault. (LED 3 flashes)	High temperature limit switch is open.	Check the operation of the indoor (evaporator) fan motor. Ensure that the supply-air temperature rise is in accordance with the range on the unit nameplate.
Flame sense fault. (LED 3 flashes)	The IGC sensed flame that should not be present	Reset unit. If problem persists, replace control board
4 consecutive limit switch trips. (LED 4 flashes)	Inadequate airflow to unit.	Check operation of indoor (evaporator) fan motor and that supply-air temperature rise agrees with range on unit nameplate information.
Ignition lockout. (LED 5 flashes)	Unit unsuccessfully attempted ignition for 15 minutes.	Check ignitor and flame sensor electrode spacing, gaps, etc. Ensure that flame sense and ignition wires are properly terminated. Verify that unit is obtaining proper amount of gas.
Induced-draft motor fault. (LED 6 flashes)	IGC does not sense that induced-draft motor is operating.	Check for proper voltage. If motor is operating, check the speed sensor plug/IGC Terminal J2 connection. Proper connection: PIN 1 — White, PIN 2 — Red, PIN 3 — Black.
Rollout switch fault. (LED 7 flashes)	Rollout switch has opened.	Rollout switch will automatically reset, but IGC will continue to lockout unit. Check gas valve operation. Ensure that induced-draft blower wheel is properly secured to motor shaft. Reset unit at unit disconnect.
Internal control fault. (LED 8 flashes)	Microprocessor has sensed an error in the software or hardware.	If error code is not cleared by resetting unit power, replace the IGC.

IMPORTANT: Refer to Table 19 — Heating Service Analysis for additional troubleshooting analysis.

LEGEND

IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode

Table 19 — Heating Service Analysis

PROBLEM	CAUSE	REMEDY
Burners will not ignite.	Misaligned spark electrodes.	Check flame ignition and sensor electrode positioning. Adjust as needed.
	No gas at main burners.	Check gas line for air, purge as necessary. After purging gas line of air, allow gas to dissipate for at least 5 minutes before attempting to relight unit. Check gas valve.
	Water in gas line.	Drain water and install drip leg to trap water.
	No power to furnace.	Check power supply, fuses, wiring, and circuit breaker.
	No 24 v power supply to control circuit.	Check transformer. Transformers with internal overcurrent protection require a cool down period before resetting.
	Miswired or loose connections.	Check all wiring and wire nut connections.
	Burned-out heat anticipator in thermostat.	Replace thermostat.
	Broken thermostat wires.	Run continuity check. Replace wires, if necessary.
Inadequate heating.	Dirty air filter.	Clean or replace filter as necessary.
	Gas input to unit too low.	Check gas pressure at manifold. Clock gas meter for input. If too low, increase manifold pressure, or replace with correct orifices.
	Unit undersized for application.	Replace with proper unit or add additional unit.
	Restricted airflow.	Clean filter, replace filter, or remove any restrictions.
	Blower speed too low.	Use high speed tap, increase fan speed, or install optional blower, as suitable for individual units.
	Limit switch cycles main burners.	Check rotation of blower, thermostat heat anticipator settings, and temperature rise of unit. Adjust as needed.
	Too much outdoor air.	Adjust minimum position. Check economizer operation.
Poor flame characteristics.	Incomplete combustion (lack of combustion air) results in: Aldehyde odors, CO, sooting flame, or floating flame.	Check all screws around flue outlets and burner compartment. Tighten as necessary.
		Cracked heat exchanger.
		Overfired unit — reduce input, change orifices, or adjust gas line or manifold pressure.
		Check vent for restriction. Clean as necessary. Check orifice to burner alignment.
Burners will not turn off.	Unit is locked into Heating Mode for a one minute minimum.	Wait until mandatory one minute time period has elapsed or reset power to unit.

Table 20 – Cooling Service Analysis

PROBLEM	CAUSE	REMEDY
Compressor and condenser fan will not start.	Power failure.	Call power company.
	Fuse blown or circuit breaker tripped.	Replace fuse or reset circuit breaker.
	Defective thermostat, contactor, transformer, or control relay	Replace component.
	Insufficient line voltage.	Determine cause and correct.
	Incorrect or faulty wiring	Check wiring diagram and rewire correctly.
	Thermostat setting too high	Low thermostat setting below room temperature.
Compressor will not start but condenser fan runs.	Faulty wiring or loose connections in compressor circuit	Check wiring and repair or replace.
	Compressor motor burned out, seized, or internal over-load open	Determine cause. Replace compressor
	Defective run/start capacitor, overload, start relay.	Determine cause and replace.
	One leg of three-phase power dead.	Replace fuse or reset circuit breaker. Determine cause.
Compressor cycles (other than normally satisfying thermostat).	Refrigerant overcharge or undercharge.	Reclaim refrigerant, evacuate system, and recharge to nameplate.
	Defective compressor.	Replace and determine cause
	Insufficient line voltage	Determine cause and correct.
	Blocked condenser.	Determine cause and correct.
	Defective run/start capacitor, overload, or start relay.	Determine cause and replace.
	Defective thermostat.	Replace thermostat.
	Faulty condenser-fan motor or capacitor.	Replace.
	Restriction in refrigerant system	Locate restriction and remove.
Compressor operates continuously.	Dirty air filter	Replace filter.
	Unit undersized for load.	Decrease load or increase unit size.
	Thermostat set too low.	Reset thermostat.
	Low refrigerant charge	Locate leak; repair and recharge.
	Leaking valves in compressor	Replace compressor.
	Air in system.	Reclaim refrigerant, evacuate system, and recharge.
	Condenser coil dirty or restricted	Clean coil or remove restriction.
Excessive head pressure.	Dirty air filter.	Replace filter.
	Dirty condenser coil	Clean coil
	Refrigerant overcharged.	Reclaim excess refrigerant.
	Air in system.	Reclaim refrigerant, evacuate system, and recharge.
	Condenser air restricted or air short-cycling	Determine cause and correct.
Head pressure too low.	Low refrigerant charge	Check for leaks; repair and recharge.
	Compressor valves leaking.	Replace compressor.
	Restriction in liquid tube.	Remove restriction
Excessive suction pressure.	High head load.	Check for source and eliminate
	Compressor valves leaking	Replace compressor.
	Refrigerant overcharged.	Reclaim excess refrigerant.
Suction pressure too low.	Dirty air filter	Replace filter.
	Low refrigerant charge.	Check for leaks; repair and recharge
	Metering device or low side restricted.	Remove source of restriction.
	Insufficient evaporator airflow.	Increase air quantity. Check filter and replace if necessary.
	Temperature too low in conditioned area	Reset thermostat.
	Outdoor ambient below 25 F.	Install low-ambient kit
Evaporator fan will not shut off.	Time off delay not finished	Wait for 30-second off delay.

Table 21 – Economizer Service Analysis

PROBLEM	CAUSE	REMEDY
Damper does not open.	Evaporator fan not on.	Check wiring between G on connection board and indoor fan contactor
	No power to economizer motor.	1. Check that SW3 is making proper contact with the damper blade. 2. Check continuity across R1 coil. If not connected, replace relay R1. 3. Check diode D1. If diode is not functioning properly, replace D1. 4. Check wiring in economizer relay pack (See unit label diagram.)
	Economizer motor failure	If there is 24 vac power at the motor terminals, but motor is not operating, replace motor
Economizer operation limited to minimum position.	OAT or EC set too high.	1. Set at correct temperature (3 F below indoor space temperature). 2. Check OAT or EC by setting set point above outdoor temperature or humidity level. If switch does not close, replace OAT or EC.
	Check wiring of economizer relay packs	1. Check continuity across relay R2 coil. If not connected, replace R2 relay. 2. Check continuity across relay R3 coil. If not connected, replace R3 relay.
	Check SAT	If supply-air temperature is over 57 F, switch T2 should be closed. If not, replace SAT.
Damper does not close.	Incorrect wiring or wiring defects.	1. Check switch 2 and 4. If non-operational, replace. 2. Check diode D2. If diode D2 is not functioning properly, replace. 3. Check wiring on economizer and on economizer relay pack (see unit label diagram).
	Check SAT	If supply air thermostat is below 52 F, switch T1 should be closed. If not, replace SAT.
	Economizer motor failure.	If there is 24 vac power at motor terminals, but motor is not operating, replace motor.

LEGEND








EC — Enthalpy Control
OAT — Outdoor-Air Thermostat
SAT — Supply-Air Thermostat

**Legend for Fig. 39 — Typical Component Arrangement
and Fig. 40 — Typical Wiring Schematic**

IMPORTANT: Refer to unit wiring label for actual unit wiring.

AHA — Adjustable Heat Anticipator
C — Contactor, Compressor
CAP — Capacitor
CC — Cooling Compensator
CH — Crankcase Heater
COMP — Compressor Motor
D — Diode
EC — Enthalpy Control
ECON — Economizer
EPS — Emergency Power Supply
EQUIP — Equipment
ER — Economizer Relay
FPT — Freeze-Up Protection Thermostat
GND — Ground
HPS — High-Pressure Switch
HS — Hall Effect Sensor
I — Ignitor
IDM — Induced-Draft Motor
IFC — Indoor-Fan Contactor
IFM — Indoor-Fan Motor
IGC — Integrated Gas Unit Controller
LED — Light-Emitting Diode
LPS — Low-Pressure Switch
LS — Limit Switch
MGV — Main Gas Valve
MTR — Motor
OAT — Outdoor-Air Thermostat
OFM — Outdoor-Fan Motor
P — Plug
PL — Plug Assembly
QT — Quadruple Terminal
R — Relay

RS — Rollout Switch
SAT — Supply-Air Thermostat
SEN — Sensor
SW1 — Switch Fully Open
SW2 — Switch Fully Closed
SW3 — Switch Min. Vent Position
SW4 — Switch Max. Vent Position
TC — Thermostat-Cooling
TH — Thermostat-Heating
TRAN — Transformer

 Field Splice
 Marked Wire
 Terminal (Marked)
 Terminal (Unmarked)
 Terminal Block
 Splice
 Splice (Marked)
— — — — — Factory Wiring
- - - - - Field Control Wiring
- - - - - Field Power Wiring
- - - - - Accessory or Optional Wiring
— — — — — To indicate common potential only;
not to represent wiring

NOTES:

1. If any of the original wire furnished must be replaced, it must be replaced with Type 90 C wire or its equivalent
2. Number(s) indicates the line location of contacts. A bracket over 2 numbers signifies single-pole, double-throw contacts. An underlined number signifies a normally closed contact. Plain numbers (no lines) signifies a normally open contact

3. Three-phase motors are protected under primary single phasing conditions
4. Thermostat: HH07AT170, 172, 174 and P272-2783
Subbase: HH93AZ176, 178 and P272-1882, 1883
5. Set heat anticipator at 14 amp. For units with 2 stages of heating, set stage 2 anticipator at 14 amp.
6. Use copper conductors only.

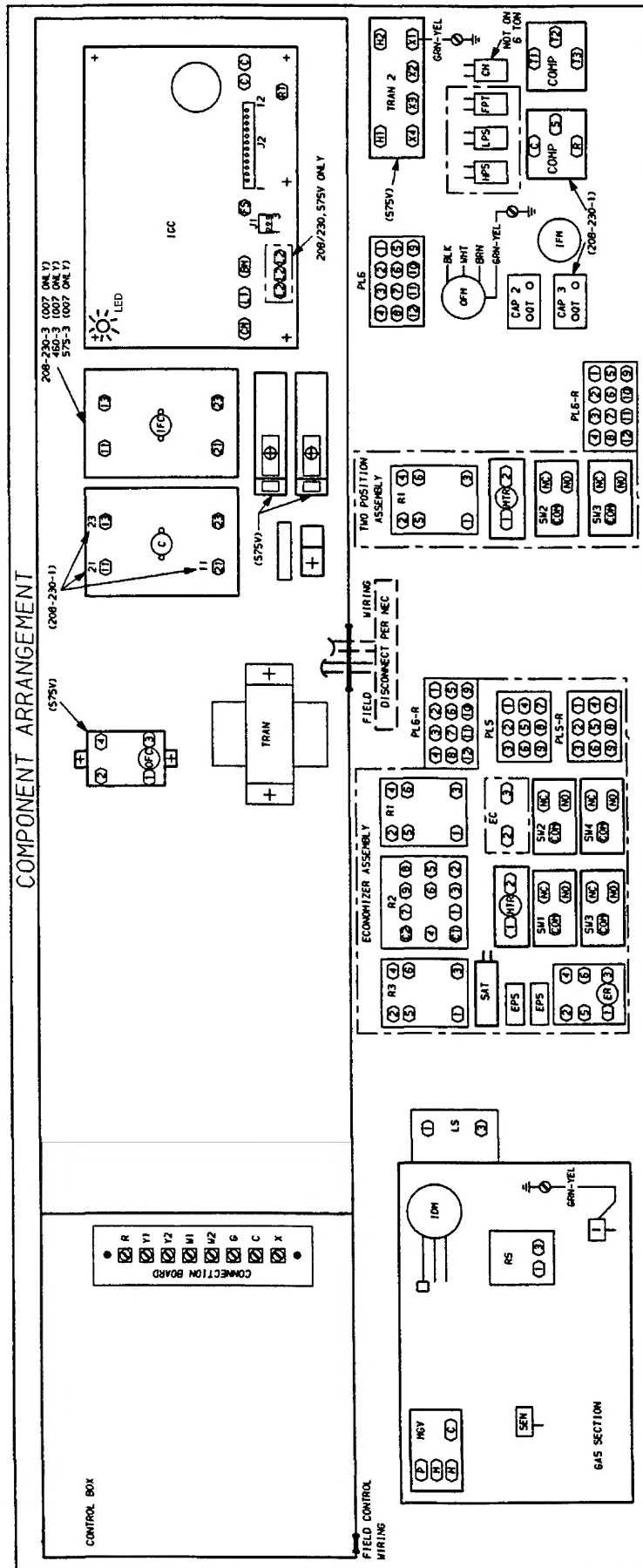
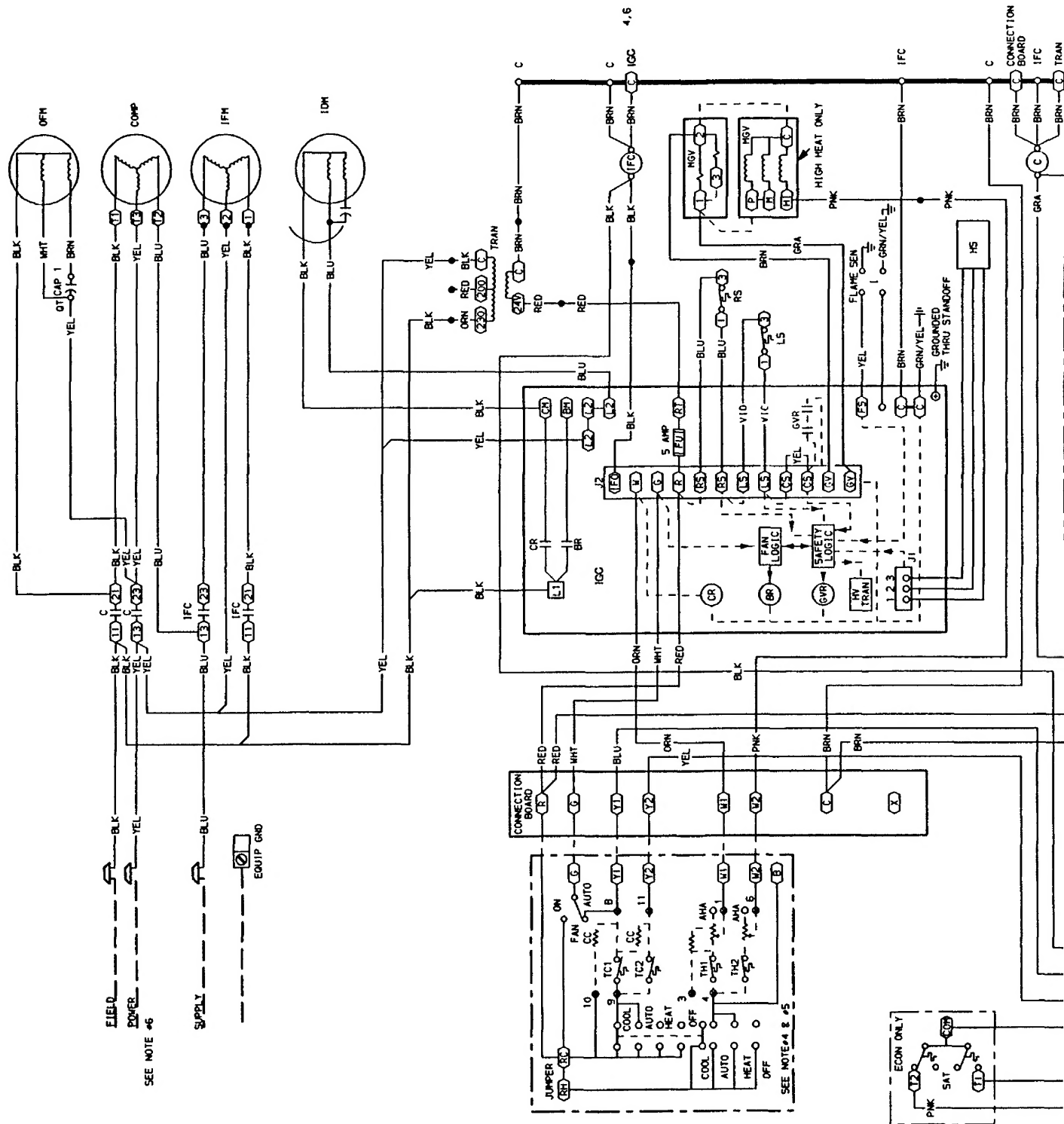


Fig. 39 – Typical Component Arrangement



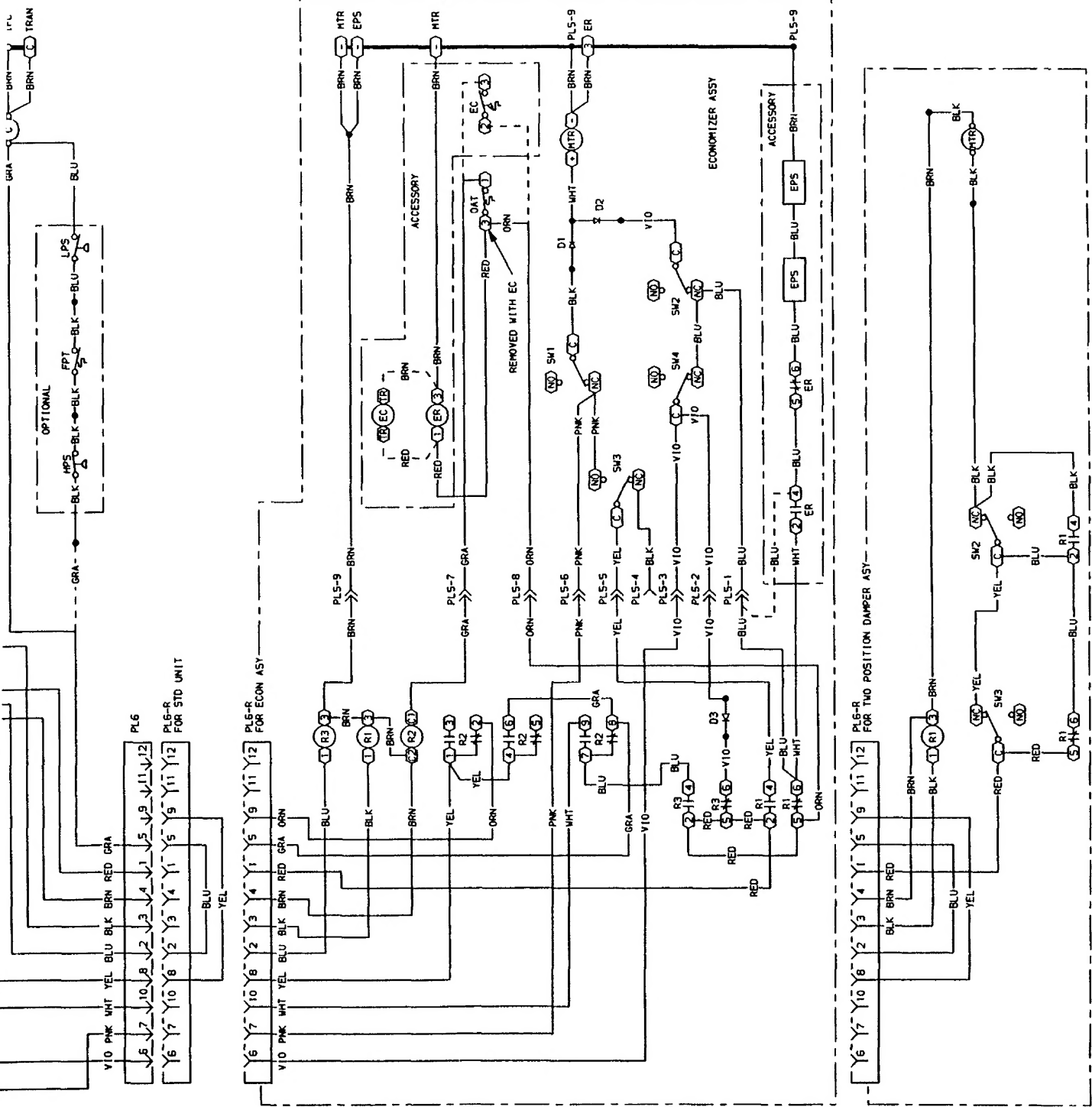


Fig. 40 – Typical Wiring Schematic

